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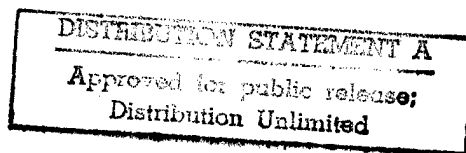
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18 FEBRUARY 1987

USSR Report

LIFE SCIENCES

BIOMEDICAL AND BEHAVIORAL SCIENCES



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UDC 616.34-008,924.1-02:766.2]-092.9

EFFECTS OF HYPOKINESIA ON CALCIUM ABSORPTION IN RAT SMALL INTESTINE

Moscow VOPROSY PITANIYA in Russian No 4, Jul-Aug 86
(manuscript received 6 May 85) pp 50-54

[Article by I. N. Sergeyev, V. B. Spirichev, M. S. Belakovskiy and
A. S. Ushakov, Institute of Nutrition, USSR Academy of Medical Sciences
Moscow]

[Abstract] Male Wistar rats were subjected to 1 to 4 weeks of hypokinesia to test the effects of inaction/immobilization on calcium uptake in the small intestine in relation to age. Studies with young (1 month, 100 g) and mature (2 months, 200 g) rats demonstrated that hypokinesia led to a time-related loss of body weight and reduction in serum calcium levels. Studies on in vitro preparations of the duodenum of adult rats indicated that there were no essential hypokinesia-induced changes in calcium absorption, and that calcium absorption diminished with age and was virtually non-existent in the mature animals. A statistically significant reduction of calcium absorption was apparent after 1 week of hypokinesia in the young rats, with subsequent decrease in absorption due to hypokinesia overshadowed by age-related loss of absorptive function. The data were consonant with the view that negative calcium balance in hypokinesia was due to excess calcium loss via urine and stools. Such effects were potentiated by age- and hypokinesia-induced diminished $1,25(\text{OH})_2\text{D}_3$ levels. Figures 1; references 21: 5 Russian, 16 Western.

12172/12955

CSO: 1840/084

EFFECT OF DIETS WITH ACTIVE VITAMIN D₃ METABOLITE AND VARYING CALCIUM AND PHOSPHORUS CONTENT ON COMPOSITION OF FREE AMINOACIDS IN BLOOD OF HYPOKINETIC RATS

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 86, pp 55-59

[Article by T. F. Vlasova, M. S. Belakovskiy, Ye. B. Miroshnikova, I. N. Sergeyev and V. B. Spirichev, Institute of Medical Biological Problems, USSR Ministry of Health, Moscow]

[Abstract] Aminoacid metabolism was studied on animals subjected to 30 day hypokinesia. The animals were placed on diets containing varying Ca/P ratios and were receiving active metabolite of vitamin D₃, viz., 24,25-dihydroxycholecalciferol. It was shown that during mobility, high consumption of phosphorus resulted in significant reduction of blood aminoacid pool, aggravating the effect of hypokinesia. Use of 24,25-dihydroxycholecalciferol, on the background of nutrition with optimal Ca:P relationship, promoted recovery of the aminoacid levels in blood of hypokinetic rats. References 22: 14 Russian, 8 Western (1 by Russian authors).

7813/12955
CSO: 1840/083

UDC 574.6:632.938:635.25

IONIZING RADIATION-ENHANCED IMMUNITY AND DISEASE RESISTANCE IN ONION

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 86
(manuscript received 18 Jun 86) pp 62-64

[Article by A. P. Dmitriyev and D. M. Grodzinskiy, corresponding member, Ukrainian SSR Academy of Sciences, Institute of Plant Physiology, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] The effects of pre-planting irradiation of onion seeds (*Allium cepa*) with ionizing radiation (Co-60; 50, 70, 100 or 150 Gy, 1.5-2.5 Gy/sec) on subsequent development of natural infections with *Peronospora destructa* were evaluated in the case of Strygunovskiy-Nosov and Oktyabr varieties. The resultant data demonstrated that irradiation in doses of 50 and 70 Gy reduced the incidence of downy mildew 3- to 4-fold at the end of July, and by 35-40% in the middle of August in the case of both varieties. Doses of 100 and 150 Gy were even more effective in the attenuation of the mycotic lesions but had an adverse effect on plant development and yields. The beneficial effects of ionizing radiation in this case were ascribed to facilitation of greater responsiveness of the plants in the production and accumulation of phytoalexins on contact with the fungal pathogen. References 10: 7 Russian, 3 Western.

12172/12955
CSO: 1840/080

UDC 616.832-009.54-07:616.74-008.931:577.152.143/-074

EFFECT OF BOTULINIC TOXIN ON ACTIVITY OF TRANSPORT ATPases

Moscow VOPROSY MEDITSINSKOY KHIMII in Russian Vol 31, No 1, Jan-Feb 85
[manuscript received 25 Jan 84] pp 65-68

[Article by N.P. Chesnokova and G.Yu. Kulyash, Pathophysiology Department and Central Research Laboratory, Saratov Medical Institute: "The Effect of Botulinic Toxin on Activity of Transport ATPases"; manuscript received 25 Jan 84; the first paragraph is an English summary from the original]

[Text] Activity of transport ATPases was studied in erythrocyte membranes and synaptosomal fraction of cervical department of spinal cord obtained from rats in dynamics of botulinic C intoxication. Na^+, K^+ -ATPase was inhibited by the competitive type in the synaptosomal brain fraction at the preclinical period of intoxication and by the noncompetitive type at the step of skeletal muscle paresis. In erythrocyte membranes activity of Na^+, K^+ -ATPase was inhibited by the mixed type at the preclinical period of intoxication and the enzymatic activity was inhibited by the noncompetitive type at the step of skeletal muscle paresis. The Na^+, K^+ -ATPase from biological membranes was reactivated by unithiol and nicotinamide in dynamics of intoxication. The toxin was shown to activate Mg^{2+} -ATPase in brain synaptosomal fraction.

Botulinic toxins of all types are known to have a pronounced neurotropic effect, which determines the specifics and severity of intoxication; they also possess a hemagglutinative property which remains largely not understood. The combination of these properties of botulinic toxins is not accidental. It is due to the presence of two components in the toxin molecule--neurotoxins and hemoagglutinates [2, 10]. In artificial conditions the two components can be separated, while when the toxin is introduced into a human body its specific biological action--namely, the property of being selectively fixed in the area of presynaptic structures or on erythrocytes, causing their damage--is probably due largely to the combined action of the neurotoxic and hemagglutinative components.

In order to determine the general regularities of the pathogenic effect of botulinic toxin on energy-dependent processes of transport through biological membranes, experiments have been conducted which investigated the Na, K - and Mg -ATPase activity of synaptosomal fractions of the spinal cord and of erythrocyte membranes as affecting the dynamics of botulin intoxication.

Methods

Experiments were conducted on unbred rats with a weight of about 250 g. Botulinic C toxin (1 DLM [not further identified], 0.0005 mg of dry toxin) was introduced intramuscularly in a dose of 0.05 mg per kg body weight; against the background of the resulting skeletal muscular paresis, the animals were investigated 24 hours later. Some of the tests were conducted in the pre-clinical intoxication period, 2 hr after intraabdominal toxin injection. The cervical department of the spinal cord was obtained from decapitated rats in cold conditions. The tissue was homogenized in 10-fold volume of 0.32 M saccharose and 0.01 M Tris-HCl buffer, pH 7.4. A fraction of unpurified synaptosomes was obtained by differential centrifuging [1, 5]. Concurrently, blood was taken for tests and erythrocyte membranes were isolated by conventional techniques [3, 7]. The activities of Na,K- and Mg-ATPases of brain synaptosomes and erythrocyte membranes were determined by methods described earlier [1, 3, 7, 9]. The composition of the incubation medium for determination of the ATPase activity of synaptosomal membranes (1 ml) in mM was: NaCl 100; KCl 20; $MgCl_2$ 5, Tris-HCl pH 7.4 50. The ATP concentrations were in the range of 0.5-5 mM. The concentrations of components in the incubation medium for the study of the activity of ATPase of erythrocyte membranes (2 ml) in mM was the following: NaCl 100; KCl 2; $MgCl_2$ 6; Tris-HCl pH 7.6 50. ATP concentrations were in the range from 0.5 to 8 mM. The dynamics of enzymatic reactions was investigated as supported by Na,K- and Mg-ATPases of erythrocyte membranes and the synaptosomal fraction of the cervical department of spinal cord. For the determination of the Michaelis constant (K_M) and the maximum substrate hydrolysis rate (V_M) direct Eisenthaler and Cornish-Bowden linear graphs were plotted [4], which are a convenient modification of the conventional Lineweaver-Burke curves.

Results and Discussion

The experiments showed in the preclinical intoxication period manifest disruptions of energy-dependent transport through erythrocyte and synaptosomal membranes accomplished with participation of Na,K-ATPase systems. The inhibition of the different systems, however, were different. The activity of Na,K-ATPase of erythrocyte membranes was suppressed as a result of combined competitive and noncompetitive inhibition, as evidenced by the simultaneous rise of K_M and a decline of the substrate hydrolysis maximum rate (table 1). On the other hand, the inhibition of the activity of Na,K-ATPases of synaptosomal fractions of the cervical department of the spinal cord occurred in a competitive fashion, as indicated by the sole rise of K_M without any changes of V_M (table 2).

The competitive inhibition of Na,K-ATPase activity of erythrocyte and synaptosomal membranes in the preclinical period of botulinic intoxication is probably indicative of similar metabolic shifts in erythrocytes and synaptosomal structures of the brain and, in particular, an excessive formation of metabolic products capable of competing with ATP for the active enzyme centers. In turn, the development of noncompetitive inhibition of Na,K-ATPases of erythrocyte membranes already in the preclinical intoxication period could be evidence of disrupted oligomer enzyme organization in the

Table 1. Variation of the Kinetic Parameter of Enzymatic ATP Hydrolysis in Erythrocyte Membranes in Botulin Intoxication Dynamics

| Experiment series | Na,K-ATPase | | Mg-ATPase | |
|---|--------------------------------|-------------------------------|-------------------------------|------------------------------|
| | V_M | K_M | V_M | K_M |
| Control | 0.64 ± 0.01 | 2.0 ± 0.082 | 0.97 ± 0.02 | 1.1 ± 0.16 |
| Preclinical intoxication period | 0.47 ± 0.01 $P < 0.001$ | 3.8 ± 0.02 $P < 0.001$ | 0.95 ± 0.03 $P > 0.05$ | 1.1 ± 0.17 $P > 0.05$ |
| The phase of skeletal muscle-lature paresis | 0.51 ± 0.02 $P < 0.001$ | 2.2 ± 0.16 $P > 0.05$ | 0.95 ± 0.03 $P > 0.05$ | 1.1 ± 0.02 $P > 0.05$ |

Note. P estimated in relation to control. Here and in table 2 K_M is in μ moles of ATP; V_M in μ moles of inorganic phosphate per 1 mg of protein per 1 part. In each series of experiments 10-11 animals were used.

membrane or blockade of thiolic groups of the enzyme under the effect of high toxin concentrations circulating in the blood, while only minimal doses of the toxin penetrate the hematoencephalic barrier. This hypothesis was confirmed by in vitro tests. Indeed, as can be seen from table 2, the preliminary preincubation of synaptosomal brain fractions with botulinic toxin in concentrations similar to the average calculated values for in vivo tests was associated with a suppression of Na,K-ATPase activity, which exhibited a combined competitive and noncompetitive inhibition.

The inhibiting effect of botulinic toxin on the activity of Na,K-ATPases of synaptosomal brain fractions in the preclinical intoxication period was achieved by intraabdominal injection of unithiol in a dose of 25 mg per 100 g of rat body weight. This was accompanied by a marked rise in the maximum ATP hydrolysis rate against the background of reduced K_M as compared with these values in the group of animals with no pharmacologic correction (see table 2). As has been demonstrated previously, unithiol provided also a pronounced increase of the specific activity of Na,K-ATPase of erythrocyte membranes [8].

The reactivation of Na,K-ATPase systems of various biological membranes during the preclinical intoxication period under the effect of an anti-oxidant and sulfohydryl group stabilizers such as unithiol indicates, on the one hand, a similarity of the mechanisms of inhibition of energy-dependent transport through erythrocyte and synaptosomal membranes, and, on the other, an important role likely to be played in the genesis of the suppression of Na,K-ATPase activity of biological membranes by inactivation of sulfohydryl groups that make up part of the various structural and enzymatic proteins of cell membranes.

Table 2. Variation of Kinetic Parameters of Enzymatic ATP Hydrolysis in Synaptosomal Fraction in Botulin Intoxication Dynamics

| Experiment series | Na,K-ATPase | | Mg-ATPase | |
|---|---|---|---|--|
| | V_M | K_M | V_M | K_M |
| Control | 8.0 ± 0.17 | 1.4 ± 0.10 | 22.9 ± 0.38 | 0.53 ± 0.04 |
| Preclinical intoxication period | 8.2 ± 0.15 $P_1 > 0.05$ | 2.1 ± 0.09 $P_1 < 0.001$ | 24.7 ± 0.42 $P_1 < 0.002$ | 0.38 ± 0.02 $P_1 < 0.01$ |
| Same with uthiniol [unithiol?] | 9.6 ± 0.18 $P_1 < 0.001$ $P_2 < 0.001$ | 0.88 ± 0.07 $P_1 < 0.001$ $P_2 < 0.001$ | 29.8 ± 0.42 $P_1 < 0.001$ $P_2 < 0.001$ | 0.36 ± 0.03 $P_1 < 0.001$ $P_2 > 0.05$ |
| Same with nicotinamide | 11.7 ± 0.24 $P_1 < 0.001$ $P_2 < 0.001$ | 0.57 ± 0.09 $P_1 < 0.001$ $P_2 < 0.001$ | 27.0 ± 0.36 $P_1 < 0.001$ $P_2 < 0.001$ | 0.29 ± 0.04 $P_1 < 0.001$ $P_2 < 0.05$ |
| Phase of skeletal musculature paresis | 7.1 ± 0.17 $P_1 < 0.001$ | 1.1 ± 0.10 $P_1 < 0.02$ | 24.8 ± 0.31 $P_1 < 0.001$ | 0.70 ± 0.04 $P_1 < 0.01$ |
| Same with nicotinamide | 8.1 ± 0.38 $P_1 > 0.05$ $P_2 < 0.02$ | 0.68 ± 0.09 $P_1 < 0.001$ $P_2 < 0.002$ | 24.8 ± 0.49 $P_1 < 0.002$ $P_2 > 0.05$ | 0.71 ± 0.06 $P_1 < 0.01$ $P_2 > 0.05$ |
| Membrane preincubation for 7 min with preboiled toxin (control) | 11.8 ± 0.23 | 0.45 ± 0.05 | 29.6 ± 0.48 | 0.35 ± 0.04 |
| Same with native toxin | 8.4 ± 0.37 $P_1 < 0.001$ | 0.86 ± 0.12 $P_1 < 0.002$ | 31.6 ± 0.37 $P_1 < 0.002$ | 0.36 ± 0.04 $P_1 > 0.05$ |

Note. P_1 calculated in relation to controls; P_2 in relation to the respective intoxication phase without pharmacological correction. 6 animals used in each experiment series.

An even more pronounced reactivation of the Na,K-ATPases of synaptosomal membranes in the preclinical period was observed when nicotinamide was administered (see table 2). Nicotinamide is known to be a stabilizer of biological membranes and has a property of normalizing electrogenesis and neurotrophic processes in pathological states [6].

In tests on animals with clinically pronounced skeletal muscle paresis, the inhibition pattern of Na,K-ATPases of the biological membranes under study was modified. The results of the tests are shown in table 2; they indicate that noncompetitive enzyme inhibition occurs in synaptosomal brain fractions, which is characterized by a reduction of K_M and V_M while the suppression of the ATPase of erythrocyte membranes was noncompetitive (see table 1). It is well known that in the conditions of noncompetitive inhibition, even with

increased enzyme affinity with the substrate, a sufficiently high substrate hydrolysis rate cannot be provided, as its concentration is increased in the incubation medium due to the absence of reversible paths connecting the stages of substrate binding and product binding.

In studying the dynamics of enzymatic reaction produced by Na,K-ATPase of the synaptosomal brain fraction in animals with paresis, nicotinamide had a normalizing effect, produced by 250 mg/kg nicotinamide during 24 hours, on the maximum hydrolysis rate of the substrate. The degree of affinity between the enzyme and substrate was also increased substantially, indicating a reduction of K_M (see table 2).

As to the activity of the Mg-ATPase of these membranes, it remained practically unaffected in intoxication dynamics of erythrocytes, while in synaptosomal brain fractions it was greatly activated during the preclinical period. Against the background of skeletal muscle paresis development, K_M increased for Mg-ATPase, but the substrate hydrolysis remained heightened, probably indicative of increased production of the enzyme, whose affinity to the substrate became notably reduced (see table 2).

An increase of the maximum substrate hydrolysis rate with the participation of the Mg-ATPase of synaptosomal fractions of the cervical department of the spinal cord was also observed in in vitro tests with preincubation of membranes with botulinic toxin in concentrations similar to the average calculated level of in vitro experiments (see table 2).

The effects of botulinic toxin on Mg-ATPase of synaptosomal brain fractions in in vitro tests thus coincided with in vivo results only partially, evidencing some modification of the biological effects of the toxin in the macroorganism. The introduction of unithiol and nicotinamide during the preclinical intoxication period revealed the possibility of a strong activization of Mg-ATPase (see table 2).

In summarizing the above data it should be noted that a characteristic feature of the botulinic toxin effect is the inhibition of energy-dependent transport through erythrocyte membranes and synaptosomal structure membranes, which is provided by the system of Na,K-ATPase. Certain similarities are observed in the inhibition pattern of the transport ATPase of various biological membranes, especially during the preclinical intoxication period; a possibility of pharmacologic correction of this enzymatic system by various antioxidants has been revealed. On the other hand, the intoxication dynamics displayed certain peculiarities in the variation of activities of Na,K- and Mg-ATPase due to the existence of structural and functional singularities of the biological membranes and the specifics of cell metabolism.

The observed disruptions of energy-dependent transport through cell membranes in the dynamics of botulinic intoxication apparently play an important role in the genesis of the pathogenic effects of the toxin and, in particular, its neurotropic and hemagglutinating activities.

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CSO: 1840/025

UDC 547.963.3:576.312.31

SYNTHESIS OF DNA IN MAMMAL BRAIN CELLS

Moscow USPEKHI SOVREMENNOY BIOLOGII in Russian Vol 100, No 1 (4), Jul-Aug 85
pp 20-28

[Article by T. M. Tretyak, Institute of Biological Physics, USSR-Academy
of Sciences, Pushchino, Moscow Oblast]

[Abstract] Although ageing is genetically programmed, factors have been found which can accelerate or slow the process. Age changes in humans begin to be found at age 45-50. The study of the mechanisms of these processes promises, if not halting, at least slowing, of the process of neurophysiological regression. The task of this review was to analyze results of the experiments of cytologists, biochemists and virologists on the synthesis of DNA in central nervous system cells. It is suggested that there are two DNA synthesis processes in mammal brain cells: a duplication process and a repair process. The intensity of each process is determined by the age of the animal. Autoradiographic and radiochemical approaches to the study of DNA synthesis in the brain cells support this theory and indicate the possibility of virally-induced DNA sythesis in the nerve cells of mature mammals. References 71: 30 Russian, 41 Western.

6508/12955
CSO: 1840/072

UDC 577.153

KINETICS OF ATP SYNTHESIS DURING INCOMPLETE UNCOUPLING AND EXISTENCE OF THRESHOLD POTENTIAL FOR FUNCTIONAL CONVERSION OF H^+ -ATPase

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 2, Sep 86
(manuscript received 11 Mar 86) pp 476-480

[Article by G. Ye. Bronnikov, Institute of Biological Physics, USSR Academy
of Sciences, Pushchino, Moscow Oblast]

[Abstract] It is shown that conversion of one functional form of H^+ -ATPase into another one, ATP-hydrolase and ATP-synthetase occurs due to the action

of a specific "threshold" potential. The rate of conversion process depends on small changes in $\Delta\mu\text{H}^+$ as compared to the threshold potential. Effect of disconnectors on stationary kinetics of ATP synthesis is due to decreased affinity of ATP-synthetase to P_H . Introduction of the concept "threshold potential" for conversion of H^+ -ATPase explains the linear relationship between the rate of electron transport chain process and the ATP synthesis rate observed at a given potential. Figures 2; references: 15: 2 Russian, 13 Western (3 by Russian authors).

7813/12955

CSO: 1840/061

UDC 577.17-576.3:612.17

CLONING OF HUMAN SODIUM-URETIC GENE FACTOR AND ITS USE IN ESTIMATING EFFECTIVENESS OF GENE EXPRESSION

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 290, No 2, Sep 86
(manuscript received 13 Mar 86) pp 490-492

[Article by A. P. Surguchev, Ye. S. Forminykh, V. N. Urakov and Corresponding Member of USSR Academy of Sciences V. N. Smirnov, All Union Scientific Center of Cardiology, USSR Academy of Medical Sciences, Moscow]

[Abstract] Extracts from cardiac cell membrane granules exhibit diuretic, sodium-uretic and hypotensive properties. The active principle in these extracts is a peptide consisting of 28 aminoacid residues: the so-called sodium uretic factor (NaF), occasionally also called auriculin or atriopeptin. Cloning of human NaF gene is described along with data on its use in evaluating effectiveness of the expression of this gene. Dot blot hybridization of a probe with RNA isolated from the atrium of spontaneously-hypertensive rats compared to control animals showed that NaF is expressed in experimental animals more effectively than in controls; this could be a compensation to increased blood pressure. Thus, the early explanations of the development of hereditary hypertension based on disturbance of NaF gene expression followed by decreased concentration of NaF in circulating blood is incorrect. NaF could be synthesized in the hypothalamus, thus expanding our concepts on the regulatory and mechanistic functions of this peptide (NaF). Figures 3; references: 15 Western.

7813/12955

CSO: 1840/061

CRYSTALLIZATION OF RIBOSOMES FROM THERMUS THERMOPHILUS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 289, No 5, Aug 86
(manuscript received 27 Jan 86) pp 1263-1266

[Article by Ye. A. Karpova, I. N. Serdyuk, Yu. S. Tarkhovskiy, Ye. V. Orlova and V. L. Borovyagin, Institute of Protein, USSR Academy of Sciences, Pushchino, Moscow Oblast; Institute of Biological Physics, USSR Academy of Sciences, Pushchino, Moscow Oblast; Institute of Crystallography imeni A. V. Shubnikov, USSR Academy of Sciences, Moscow]

[Abstract] The authors report the production of crystals of 70S ribosomes from a new source, the highly thermophilic bacterium *Thermus thermophilus*. Ribosomes for crystallization were obtained from *Th. thermophilus* strain HB8 by double washing in a buffer with high ion strength. The ribosome preparation was studied for homogeneity by high speed sedimentation in a buffer on an ultracentrifuge. Analysis indicated that the preparation is homogeneous. The spatial resolution achieved in the work is as yet only 7-8 nm. However, the 3-dimensional crystals produced are time stable, have high transverse parameters and at times faceting was observed on the largest crystals. The data indicate that *Th. thermophilus* may be a promising source for future production of ribosome crystals suitable for x-ray structural analysis. Figures 2; references 7: 2 Russian, 5 Western.

6508/12955
CSO: 1840/060

SUPERACTIVITY OF ACID PHOSPHATASE IN INVERTED MICELLES OF SURFACE-ACTIVE AGENTS IN ORGANIC SOLVENTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 289, No 5, Aug 86
(manuscript received 4 Mar 86) pp 1271-1273

[Article by A. V. Levashov, N. L. Klyachko, A. V. Pshezhetskiy, I. V. Berezin, corresponding member, USSR Academy of Sciences, N. G. Kotrikadze, B. A. Lomsadze and K. Martinek, Moscow State University imeni M. V. Lomonosov; Tbilisi State University]

[Abstract] Superactivity upon transfer of an enzyme from water into an inverted micelle medium has been noted for α -chymotrypsin, luciferase and peroxidase. The greatest acceleration is accompanied by the reactions which catalyze acid phosphatase. Results describing this acceleration by a factor of up to 300 are described in this article. The most important result observed is that catalytic activity of acid phosphatase in a micellar medium is significantly higher than in an aqueous solution. Inverted micelles can also be used to study the specific interactions of surfactants with enzymes they contain. Figure 1; references 12: 6 Russian, 6 Western.

6508/12955
CSO: 1840/060

UDC 576.33:577.115

POSSIBLE PARTICIPATION OF LIPIDS IN ACCUMULATION OF INFORMATION AND
AMPLIFICATION OF BIOLOGICAL SIGNALS

Leningrad ZHURNAL EVOLYUTSIONNOY BIOKHIMII I FIZIOLOGII in Russian Vol 22,
No 4, Jul-Aug 86 (manuscript received 23 Dec 85) pp 357-360

[Article by L. D. Bergelson, Institute of Bioorganic Chemistry imeni M. M.
Shemyakin, USSR Academy of Sciences, Moscow]

[Abstract] Certain chemical ligands can cause cellular responses at extremely low concentrations. The induction of chemotaxis, for example, occurs at some distance from the source of the attractant, where its concentration is so low that there is but one molecule of the effector for many thousands of cell targets. The question of the mechanism allowing one molecule to excite large numbers of targets remains unclear. Seeking the answer to this question, the authors studied the interaction of prostaglandins with high density serum lipoproteins. It was found that one prostaglandin interacts specifically with HDL, causing restructuring of the outer monolayer of the lipoprotein globules, even at very low concentrations. Calculations indicated that in the relaxation time of the system, each prostaglandin molecule collides hundreds of times with each HDL globule. In such a system, with low stability of the complex of effector plus target, high diffusion rate of the effector in the medium and low rate of relaxation of changes evoked by the effector, the excited state of the target can be maintained even without the bond detected by classical methods. A possible source of the required energy is exothermic aggregation of the globules. Figures 2; references 5: 1 Russian, 4 Western.

6508/12955

CSO: 1840/077

ENVIRONMENT

UDC 613.26:631.82]-07

NITRATE AND NITRITE LEVELS IN FOOD PRODUCTS DERIVED FROM PLANTS GROWN ON MINERAL FERTILIZERS

Moscow VOPROSY PITANIYA in Russian No 4, Jul-Aug 86
(manuscript received 9 Oct 85) pp 65-67

[Article by V. I. Murokh, Chair of General Hygiene, Belorussian Institute for the Advanced Training of Physicians, USSR Ministry of Health, Minsk]

[Abstract] Plant foodstuffs cultivated in Belorussia on mineral fertilizers were analyzed for concentrations of nitrates and nitrites in relation to fertilizer dose. The tabulated data demonstrate that highest nitrate levels were detected in cabbage, potatoes, sugar beets and cereals. Lowest nitrate concentrations were detected in carrots. Nitrites were lacking in cabbage and sugar beets regardless of the fertilizer dose, and were low (0.013-0.72 mg/kg) in the other plants without relation to the dose of fertilizer employed. With the standard use of 300 kg/hectare of mineral fertilizers in Belorussia there was no direct relationship between nitrate and nitrite levels in the plants, or between nitrites and fertilizer dose. Further studies will be required to assess the relationship between the dose of mineral fertilizer used and the transformation of nitrates to nitrites in plants. References 20: 17 Russian, 3 Western.

12172/12955
CSO: 1840/084

UDC 614.31.635.21.6:546.175]-074

RESIDUAL LEVELS OF NITRATES IN CUCURBITACEOUS CROPS AND VEGETABLES GROWN IN DZHAMBUL OBLAST

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 86
(manuscript received 12 Jun 85) pp 72-73

[Article by O. A. Salata, I. R. Narmukhamedov, L. K. Tkay and V. A. Tsoy, Dzhambul Oblast Sanitary-Epidemiological Station]

[Abstract] Because of increased use of mineral fertilizers in agriculture, a dangerous situation arose of accumulated levels of nitrates in the

environment. Cases of gastrointestinal disorders were noted which were related to consumption of cucurbitaceous cultures. Because of the fact that nitrates may be converted to carcinogenic nitrites, residual levels of nitrates were studied in watermelons, cantaloupes, potatoes, cabbage, tomatoes and cucumbers. The following recommendations were made: purchase of these items is to be permitted only after adequate laboratory testing; selling of potassium nitrate on open market is prohibited; spot raids are made to control sales of these vegetables. References 3 (Russian).

7813/12955

CSO: 1840/083

UDC 599.323.4:591.526

RELATIONSHIP OF SEASONAL FLUCTUATIONS IN NUMBERS OF GREAT GERBIL (RHOMBOMYS OPIMUS, RODENTIA, CRICETIDAE) TO ITS REPRODUCTION INTENSITY

Moscow ZOOLOGICHESKIY ZHURNAL in Russian Vol 65, No 7, Jul 86
(manuscript received 24 Oct 84) pp 1061-1071

[Article by L. D. Dubyanskaya, Central Asian Scientific Research Antiplague Institute, Alma-Ata]

[Abstract] Three geographical locations were selected for this study: Near-Aral-Karakum, where the numbers of gerbils (peschanki) and their reproduction was high and stable; Bakanass area with most unstable indices and lowest numbers of animals; and northern Near-Aral area with intermediate indices. Seasonal fluctuations were analyzed comparing the spring-autumn and the autumn-spring patterns of animal numbers. Statistical analysis of data showed that the fluctuations in the number of these animals correlated significantly with the spring-summer reproductive activity. Activity of April, May and June reproductive cycles was responsible for Spring-Autumn fluctuations in animal numbers. The first breeding cycle in April and the second in May affected winter survival of animals: the first inversely and the second directly. It was concluded that the use of reproductive data could be used for modelling prognosis of total number of great gerbils. Figures 2; references 19 (Russian).

7813/12955
CSO: 1840/076

UDC 575.24:595.773.4

MOLECULAR MECHANISMS OF DEVELOPMENT OF FULL AND MOSAIC MUTATIONS

Moscow GENETIKA in Russian Vol 21, No 8, Aug 85
(manuscript received 2 Apr 84; in final form 19 Nov 84) pp 1253-1260

[Article by G. L. Dianov, Ye. A. Vasyunina, O. I. Sinitsyna, L. P. Ovchinnikova and R. I. Salganik, Institute of Cytology and Genetics, Siberian Division, USSR Academy of Sciences, Novosibirsk]

[Abstract] In mosaic mutation, some progeny have mutations, some retain the initial wild phenotype. Mosaic mutations occur when damage occurs only in one strand of the DNA. The induction of full mutations remains an unsolved problem of genetics. The authors utilized the method of site-directed mutagenesis to perform an experimental investigation of mechanisms of development of full and mosaic mutations, allowing selective modification of the nitrogen bases in one strand of DNA or in both strands in closely located sites. The data from the studies demonstrated experimentally the molecular mechanism of development of both mosaic and full mutations. Mosaic mutations were found to arise as a result of permutation damage to one strand of DNA as was thought. However, the results do not confirm the suggestion that full mutations may be a result of damage of one strand and transfer of this damage to the second strand. Simultaneous damaging of both DNA strands leads to induction of a large number of full mutations. Damaging of only one strand yields 10 to 20 times fewer full mutations. Full mutations thus arise as a result of damage to both strands of DNA in the sector related to the mutation gene. Figures 2; references 22: 6 Russian, 16 Western.

6508/12955
CSO: 1840/066

VARIABILITY OF BARLEY WITH REPEATED TREATMENT OF TWO SUCCESSIVE GENERATIONS
BY MUTAGENIC FACTORS. PART 2. VARIABILITY OF QUANTITATIVE CHARACTERISTICS

Moscow GENETIKA in Russian Vol 21, No 8, Aug 85
(manuscript received 12 Jul 84; in final form 5 Nov 84) pp 1327-1331

[Article by M. A. Pitirimova, Agrophysical Scientific Research Institute,
Leningrad]

[Abstract] A study was made of the nature of the variability of certain quantitative characteristics of barley in M_2 - M_4 after two exposures to mutagens. The effectiveness of selection of plants based on productivity characteristics was determined. The population of barley was found to stabilize rapidly. Selection based on productivity was found to be ineffective. Extremal factors in the environment were found to eliminate weak individuals with reduced viability from the population. The more resistant members which survive form population M_2 and subsequent generations, facilitating rapid stabilization of the experimental population. This makes work related to selection of mutations of quantitative characteristics more difficult. Figure 1; references 15: 11 Russian, 4 Western.

6508/12955
CSO: 1840/066

UDC 633.11:633.14:631.523

C-COLORATION OF PLANT CHROMOSOMES IN PROGENY OF SHORT- AND TALL-STEM FORMS
OF WHEAT-RYE HYBRID OF WHEAT TYPE, OBTAINED BY CROSSING SOFT WHEAT AND SHORT-
STEM EM-1 RYE MUTANT

Moscow GENETIKA in Russian Vol 21, No 8, Aug 85
(manuscript received 3 Aug 84; in final form 5 Dec 84) pp 1332-1338

[Article by V. I. Semenov, Ye. V. Semenova and M. A. Makhalin, Main Botanic
Garden, USSR Academy of Sciences, Moscow]

[Abstract] The purpose of this work was to check the assumption that short stems result from the rye genetic material in a wheat-rye cross and that instability of progeny in terms of plant height is related to the cytogenic instability of translocant rye chromosomes, their irregular behavior in meiosis and their loss in certain plants. Plants which lose the rye chromosomes become tall-stem plants. Experimental data did not fully confirm the assumption. No short-stem progeny were found which contained no rye chromosomes, nor were no tall-stem progeny found which contain no rye chromosomes. In spite of this contradiction, the authors have no doubt that short-stem progeny result from the presence of translocant rye chromosomes. Figures 2, references 7: Russian.

6508/12955
CSO: 1840/066

STUDY OF CHROMOSOMAL COMPOSITION OF GLUTEN STRAINS OF RYE-WHEAT GRASS HYBRIDS
BY C BRANDING OF CHROMOSOMES

Moscow GENETIKA in Russian Vol 21, No 8, Aug 85

(manuscript received 1 Aug 84) pp 1339-1345

[Article by V. I. Semenov, Ye. V. Semenova, M. A. Makhalin and T. R. Khrapkova,
Main Botanic Garden, USSR Academy of Sciences, Moscow]

[Abstract] Late generation rye hybrids were tested, the quantity of bonded gluten in the specimens investigated by washing of gluten proteins from the grain of each plant and even each head. The chromosome composition of the plants was studied on the basis of mitotic chromosomes in the cells of the tips of growing grain heads. The standard C-banding method was utilized. It was found that the characteristic of gluten content was controlled by several chromosomes. The transmitted chromosome fragment either contains a block of closely bonded genes controlling the formation of gluten proteins or a single gene which closes the chain of metabolism of gluten proteins, while all remaining genes are present in rye. The mechanism of development of wheat grass-rye translocation probably consists of the development of cycles of centric breaks and fusions among the wheat grass chromosomes in the hybrid and also among the rye chromosomes. A rye-wheat grass's centric union of fragments occurs at random at some moment, causing translocation which is captured by selection for gluten content of the grain. Figure 1, references 16: 14 Russian, 2 Western.

6508/12955

CSO: 1840/066

CYTOGENETIC RESULTS OF HYPERBARIC OXYGENATION IN SERIES OF CELL CYCLES OF
LYMPHOCYTES OF HUMAN PERIPHERAL BLOOD

Moscow GENETIKA in Russian Vol 21, No 8, Aug 85

(manuscript received 31 Jul 84) pp 1361-1367

[Article by Ye. P. Guskov and T. P. Shkurat, Department of Genetics and
Cytology, Rostov State University imeni M. A. Suslov]

[Abstract] The purpose of this work was to study the cytogenic effects of hyperbaric oxygenation at various pressures in a number of cell cycles of human peripheral blood. The studies were performed on blood taken from the veins of a 38-year old healthy male. Blood samples were exposed to 1, 3 or 6 atm. gauge oxygen pressure and the materials were fractionated at intervals of 30 minutes following one hour under pressure. Chromosomal restructuring induced by hyperbaric oxygenation differed, statistically

reliably, from the control in all experimental versions. Restructuring tended to increase in later mitoses, primarily as chromatid breaks. Figures 5, references 11: 3 Russian, 8 Western.

6508/12955
CSO: 1840/066

UDC 575.591

MEDICAL-GENETIC STUDY OF THE POPULATION OF KOSTROMA OBLAST. PART 2.
DIVERSITY OF HEREDITARY PATHOLOGY IN FIVE RAYONS

Moscow GENETIKA in Russian Vol 21, No 8, Aug 85
(manuscript received 28 Jun 84; after revision 12 Dec 84) pp 1372-1379

[Article by Ye. K. Ginter, A. A. Revazov, M. I. Talanov, O. L. Nechvolodova, O. V. Khlebnikova, I. D. Lukasheva, M. A. Byalik and L. K. Mikhaylova, Institute of Medical Genetics, USSR Academy of Medical Sciences, Moscow]

[Abstract] The characteristics of hereditary pathology in the population of Kostroma Oblast were studied. Methods were described in a previous report. The frequency of autosomal-dominant and X-linked recessive genes were calculated by the standard methods. In general, the radius of propagation of a mutant gene, judged from related families with defined pathologies, was far beyond the framework of elementary populations. The distance between points of birth of an affected parent and an affected child can be considered a measure of the propagation of a gene in a single generation. This distance averaged 42.12 km. Frequencies of recessive genes causing hereditary pathology were computed for autosomal-dominant and X-linked pathologies. References 17: 6 Russian, 11 Western.

6508/12955
CSO: 1840/066

UDC 575.24:633.16

BARLEY VARIABILITY DURING REPEATED TREATMENT OF TWO SUCCESSIVE GENERATIONS WITH MUTAGENIC FACTORS. PART 1. EFFECT OF ETHYLENIMINE ON GAMMA-IRRADIATED PLANTS

Moscow GENETIKA in Russian Vol 21, No 7, Jul 85
(manuscript received 12 Jul 84; after final revision 5 Nov 84) pp 1222-1224

[Article by M. A. Pitirimova, Agrophysical Scientific Research Institute, Leningrad]

[Abstract] Irradiation of vegetative plants is one of the promising methods for production of inheritable mutations. However, its effectiveness is low and increased radiation dose has a damaging effect in M_1 , lowering the yield

of the mutant forms in later generations. An attempt was made to increase experimental mutations in vegetative plants by repeated mutagenic action on their offspring. Analysis of M_2 showed low level mutation in irradiated barley. Treatment of M_2 seeds with ethyleneimine increased significantly the yield of mutant forms showing a synergistic effect with irradiation, exceeding severalfold the additive effect. References 9: 8 Russian, 1 Western.

7813/12955
CSO: 1840/065

UDC 575.1:576.858

CONSTRUCTION OF CHROMOSOMAL GENETIC MAP FOR CHOLERA VIBRIO BASED ON CONJUGATIVE CROSSINGS

Moscow GENETIKA in Russian Vol 21, No 7, Jul 85
(manuscript received 15 Sep 84) pp 1090-1097

[Article by N. I. Smirnova, T. S. Ilina, G. A. Yeroshenko, L. F. Livanova and G. B. Smirnov, All Union Scientific Research Antiplague Institute "Mikrob", Saratov; Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

[Abstract] Generalized data are reported on mapping a cholera vibrio chromosome using *V. cholerae* classica and *V. cholerae* el tor donor and recipient strains. A genetic map for this chromosome was constructed showing localization of 35 genetic markers participating in biosynthesis of various amino-acids, bases and vitamins. Location of a number of genes (ala-60, pur-61, pur-45, pur-46, ule-60, val-60, thi-60, met-61) was identified which were absent in the genetic map of cholera vibrio chromosome reported by American investigators. Comparative analysis of their chromosomal regions indicated genetic resemblance between these two biotypes. Figures 2; references 13: 4 Russian, 9 Western.

7813/12955
CSO: 1840/065

COMPARATIVE STUDY OF EUPLOID AND ANEUPLOID PLANTS IN F_2 - F_3 GENERATIONS OF HYBRIDS TRITICUM PALEOCOLCHICUM MEN. WITH INCOMPLETE WHEAT ELYMUS AMPHIDIPOID

Moscow GENETIKA in Russian Vol 21, No 7, Jul 85
(manuscript received 2 Aug 84) pp 1199-1209

[Article by M. A. Maslova, V. I. Semenov, V. D. Smyslova and Ye. V. Semenova, Main Botanical Garden, USSR Academy of Sciences, Moscow]

[Abstract] Extensive studies were carried out in the Main Botanical Garden, USSR Academy of Sciences on production and evaluation of hybrids from various wheat brands with incomplete wheat-elymus amphidiploids. The goal of this study was to investigate the characteristics of formation and meaning of various qualitative indices important in respect to selection of plants with differing number of chromosomes isolated in F_2 and F_3 hybrids obtained from *Triticum paleocolchicum* Men. and incomplete wheat elymus amphidiploids AD-90. It was shown that 28-chromosome euploid plants resembled essentially the maternal plants *T. paleocolchicum*. Based on most indices, aneuploids were less advantageous than the euploids because of their genetic-physiological imbalance. On the basis of ear characteristics, the F_2 and F_3 plants could be divided in four types: 1) maternal, 2) paternal, 3) intermediate and 4) original. The intermediate type appeared among the aneuploid plants containing one or more M genom chromosomes as well as among the euploid forms with 28-chromosomes, probably due to translocations. The number of original types increased with increasing number of elymus chromosomes. The highest level of new forms was observed in aneuploid forms with polychromosomal additions. These plants could serve as donors for original derivatives valuable in breeding. Figures 4; references 8 (Russian).

7813/12955
CSO: 1840/065

UDC 633.491:631.527

HYBRIDIZATION OF SOLANUM BERTHAULTII HAWK. WITH WILD AND CULTURED POTATO TYPES AIMING AT TRANSMISSION OF LEAF PUBESCENCE INDEX BY MULTICELLULAR GLANDULAR TRICHOMES

Moscow GENETIKA in Russian Vol 21, No 7, Jul 85
(manuscript received 2 Oct 84) pp 1215-1221

[Article by I. M. Surikov, N. A. Zhitlova and L. I. Alekseyeva, All-Union Scientific Research Institute of Plant Raising imeni N. I. Vavilov, Leningrad]

[Abstract] Viral diseases of potatoes are spread by moths, cicadas and other pests. In an attempt to assure protection against such pests, two cultures of *Solanum tuberosum*, dihaploids of *S. Tuberosum* species *S. Andigenum*, *S. Rybinii*, *S. Polytrichon* and *S. Pinnatisecum* were crossed with *S. Berthaultii*

possessing leaf glandular trichomes with protective properties against various pests. Successful hybridization depended on phylogenetic relationship among the species and the level of ploidy between the partners. Hybrid seeds did not germinate under normal conditions but did produce shoots after membrane damage and in vitro explantation. Different levels of leaf pubescence were shown by these hybrids. Hybrids from diploid parents showed increased density of glandular B-type trichomes of the leaf in comparison to tetraploid hybrids. The hybrid plants obtained gave only tuberous offspring. Almost all of them bloomed but so far it was impossible to obtain any seeds from them. Figures 3; references 13: 3 Russian, 10 Western.

7813/12955

CSO: 1840/065

UDC 575.24+576.891.5

REPLICATION OF DNA NECESSARY TO FIX INDUCED MUTATIONS TO STREPTOMYCIN
RESISTANCE IN UV-IRRADIATED ESCHERICHIA COLI CELLS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 289, No 5, Aug 86
(manuscript received 4 Mar 86) pp 1244-1248

[Article by Academician N. P. Dubinin and V. D. Filippov, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] The best studied model of structural mutations are those of Str which arise at locus rpsL, coded by one of the ribosome proteins of E. coli, and impart streptomycin resistance. Fixation of the Str mutations induced by UV light in E. coli WP2 has been shown to occur under conditions unfavorable for protein synthesis and with no increase in DNA in a culture. It has been suggested that Str is fixed in the process of prereplicative excision repair of DNA. In recent studies, Str mutations were not fixed without post radiation protein synthesis and could be stopped by light or the mfd system. This article shows that fixation of the Str mutations in WP2 cells is blocked by adding a DNA synthesis inhibitor to the post radiation synthesis medium, indicating that fixation of most Str mutations in E. coli cells exposed to moderate UV light depends not on excision repair, but rather on vegetative replication of DNA. Figures 2, references 9: 1 Russian, 8 Western.

6508/12955

CSO: 1840/060

GENETIC STUDY OF PRODUCTS OF FUSION OF PROTOPLASTS OF FUNGUS AUREOBASIDIUM PULLULANS

Moscow GENETIKA in Russian Vol 21, No 6, Jun 85
(manuscript received 31 Jul 84) pp 919-926

[Article by N. V. Mironenko, Leningrad Institute of Nuclear Physics imeni V. P. Konstantinov, USSR Academy of Sciences]

[Abstract] The method of protoplast fusion has been used as a tool for genetic analysis of many fungi. The authors utilized the method of protoplast fusion for genetic study of *A. pullulans*, which has a number of peculiarities making it a convenient and practically important object for genetic studies. This article presents a study of the spontaneous and UV-induced mitotic instability of interstrain products of fusion of *A. pullulans* protoplasts. Stable prototrophic hybrids were used for genetic study. Mitotic instability and UV sensitivity were analyzed simultaneously on two strains, with cultures grown on a minimal medium at 25°C for 8 days. The results indicated that the method of protoplast fusion can be used to obtain heterozygote hybrids in which UV rays induce auxotrophic segregants which apparently develop as a result of mitotic recombination. A proof of the hybrid origin is found in data on mitotic splitting. A significant increase in Ade⁻-segregants with increasing UV radiation dose shows that the UV rays induce the mitotic splitting. The appearance of mitotic splitting in the form seen is unique for this fungus, and has not been previously described in other fungi. The possible mechanism of the phenomenon is not discussed. Figures 3; references 31: 18 Russian, 13 Western.

6508/12955
CSO: 1840/064

UDC 575.1.579

IMMUNITY OF TRANSPOSITION OF BACTERIOPHAGE Mu. INFLUENCE OF MUTATION AT *kil* GENE ON DEVELOPMENT OF IMMUNITY

Moscow GENETIKA in Russian Vol 21, No 6, Jun 85
(manuscript received 30 Aug 84) pp 927-935

[Article by M. A. Mogutov, G. A. Velikodvorskaya, N. S. Kobets and E. S. Piruzyan, Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] Transposons coding ampicillin resistance cannot be integrated into plasmids carrying copies of TnA. Transposition immunity has been demonstrated to be provided by the transposons Tn1, Tn801, Tn802, Tn3 and Tn2660. The bacteriophage Mu is a complex transposon, and transposition of its DNA is a necessary stage in lysogen and lytic development. The purpose of this work was to study the influence of various Mu DNA sequences in the

replicon target on the process of transposition between independent replicons. Two types of experiments demonstrate that the Mu phage contains a DNA sequence located near the c end and containing early phage genes, the presence of which in the recipient plasmid prevents subsequent integration of Mu DNA into the plasmid. In some cases, the presence in the cell of a multicopy plasmid containing only a portion of the early area of the Mu genome leads to great delay of lysis and separation of phage particles upon development in host cells. The molecular mechanism of Mu phage transposition immunity is unclear, and progress can be achieved after identification of other components of the system and action sectors. Figures 4; references 32: 6 Russian, 26 Western.

6508/12955

CSO: 1840/064

UDC 575.591

MEDICAL-GENETIC STUDY OF POPULATION OF TURKMENIA. PART 6. INTRA-POPULATION VARIABILITY IN ANALYSIS OF INTER-MARRIAGE MIGRATION AND ABO AND Hp MARKER SYSTEMS

Moscow GENETIKA in Russian Vol 21, No 6, Jun 85
(manuscript received 28 Jun 84) pp 1039-1046

[Article by Sh. M. Turayeva, Ye. K. Ginter, A. A. Revazov, R. F. Garkavtseva, Ye. N. Sotnikova and Ye. A. Bobkova, (deceased), Institute of Medical Genetics, USSR Academy of Medical Sciences, Moscow]

[Abstract] This article continues a series intended to determine population-genetic mechanisms of propagation of hereditary diseases in the Turkmenian ethnic group. The continuing disappearance of tribal organization in Turkmenia makes the study particularly interesting. The present report estimates the differentiation of Turkmenian population in terms of such population structure characteristics as inter-marriage migrations and distribution of gene frequencies of the ABO and Hp marker systems. All of the populations studied are socially homogeneous and live in the arid zone. The population structure specifics determined indicate that each tribe continues to have, at least in part, its own spectrum of hereditary pathology, individual forms of hereditary disease being locally accumulated. References 13: 10 Russian, 3 Western.

6508/12955

CSO: 1840/064

GENETIC-DEMOGRAPHIC STUDY OF URBAN TURKMEN-TEKE SAMPLE WITH BEHAVIORAL ABNORMALITIES

Moscow GENETIKA in Russian Vol 21, No 6, Jun 85

(manuscript received 18 Apr 84; final version received 12 Dec 84) pp 1056-1061

[Article by L. G. Kalmykova, V. A. Dyukov, R. A. Ibragimova, T. Ye. Shumova and N. S. Osina, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

[Abstract] A study is reported of the basic mental disease schizophrenia, the genetics of which have not been fully developed. The study was based on the concept of schizophrenia as a hereditary heterogeneous state which is a result of the effects of point mutations of various genes in the genome having various fields of action within the limits of the brain, as a result of which a significant phenotype variety of the psychosis develops. Thirty-six families of schizophrenia patients were studied. Of the 36 cases studied, 27.8% could be considered phenocopies, and the remaining 26 families were studied more closely, revealing 18 secondary cases of schizophrenia in close relatives of patients, 19 cases of manifest nervous-mental pathology requiring hospital treatment and 20 other nervous-mental disorders such as epilepsy, oligophrenia and severe neurologic disorders. In 24.2% of cases, those affected were parents, in 75.5% siblings and in 33.3% children. A high level of inbreeding was observed in the population studied. Figures 2, references 7: 4 Russian, 3 Western.

6508/12955

CSO: 1840/064

UDC 612.825:612.825.5

TOPICAL ORGANIZATION OF SOMATIC PROJECTIONS IN CEREBRAL CORTEX OF FUR SEAL

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 3, May-Jun 85
(manuscript received 28 May 84) pp 344-351

[Article by T. F. Ladygina, V. V. Popov and A. Ya. Supin, Institute of Evolutionary Morphology and Ecology of Animals imeni A. N. Severtsov, USSR Academy of Sciences, Moscow]

[Abstract] Information is needed on topical representation of visual, auditory and somatosensory analyzers in projection areas of the cortex in order to clarify the specifics of transmission of afferent information to the cortex. The details of topical projections differ in different animals. The authors therefore studied the somatotopics of projections in marine mammals in which the adaption to an aquatic life might lead to specific organization of the skin sensitivity system. This article presents results of studies of the topical organization of somatic projections in the cerebral cortex of the northern fur seal *Gallorhinus ursius*, a member of the Pinnipedia. Experiments were performed on two immature males around two years of age and two mature females. The entire somatosensory cortex of the animals was studied by systematic insertion of microelectrodes at 1 mm intervals. Areas of the skin surface which produced activity on the microelectrodes were mapped to areas of the cortex. A significant disproportionality of projections of various body parts onto the somatosensory cortex was observed. The greatest area is occupied by the head, exceeding the total area of projection of the trunk and extremities together. The lips and tip of the nose make up the greatest area within the area mapped to the head. Figures 4; references 10: Western.

6508/12955

CSO: 1840/068

UDC 5617.7-007.681:615.837.3-036.8

EFFECTIVENESS OF EXPERIMENTAL-CLINICAL ULTRASONIC STIMULATION OF DRAINAGE
SYSTEM OF EYE WITH OPEN-ANGLE GLAUCOMA

Odessa OFTALMOLOGICHESKIY ZHURNAL in Russian No 6, 1986
(manuscript received 7 Mar 85) pp 348-351

[Article by G. I. Dolzhich, candidate of medical sciences, Eye Diseases
Department, Rostov Order of People's Friendship Medical Institute]

[Abstract] A study was made of the possibility of restoring natural circulation of intraocular fluid by ultrasonic vibration of the drainage system of the eye. An ultrasonic instrument was developed with a helical waveguide allowing variable ultrasonic oscillation vectors to be achieved: torsional, longitudinal and combined. The device, protected by Author's Certificate No. 106583, is illustrated and its use described. Experiments on isolated eyes established that the maximum acoustic effect occurs in the zone of contact of the ultrasonic instrument with the ophthalmic tissue, in the area of the corneoscleral trabecula. The oscillations attenuate exponentially in the eye. With an amplitude of 8 μm , the vibrations propagated to the ciliary body, but were not detected in the retina or ocular contents. The experiments confirmed the possibility of restoring natural circulation of the intraocular fluid in patients with open angle glaucoma, with intraocular pressure normalized in 34.6% of eyes in 180 patients (260 eyes). Figures 2; references 7 (Russian).

6508/12955
CSO: 1840/130

HYPERBARIC TREATMENT FOR ATHEROSCLEROSIS

Moscow TEKHNIKA-MOLODEZHI in Russian No 8, Aug 86, pp 18-19

[Article by Slava Tayns]

[Abstract] Experiments in a type OKA-MT hyperbaric chamber, in which subjects are exposed to pure oxygen at 2 atm.abs., have shown that such "oxygen baths"

can be used to treat ischemic heart disease, rheumatic defects, diabetes, dystrophic changes to the retina, gastric ulcers and many other diseases. Over 20,000 oxygen barotherapy sessions have been performed on 2,000 cardiovascular disease patients. In all cases, the results of the treatment were positive. There are practically no contraindications to this therapy. Candidate of Medical Sciences Yuriy P. Mironenko has discovered that sclerotic plaques contain electrostatic bonds. In cooperation with Candidate of Technical Sciences G. Gertsik, Mironenko utilized a pulsed barochamber in which high and low air pressures alternate, with induction coils in the walls connected to an alternating current source. This combination of pressure and magnetic fields was found to be effective in breaking up atherosclerotic plaque. In combination with thermography, hyperbaric oxygenation can be used to locate mammary breast tumors by their increased cell temperature.

6508/12955
CSO; 1840/111

UDC 616-001.17-085.874-032:611.33]-092;612.332.74

PROTEIN ASSIMILATION BY BURN PATIENTS ON BACKGROUND OF GRADED HIGH CALORIC GASTRIC GAVAGE

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 86
(manuscript received 20 Feb 85) pp 23-26

[Article by A. V. Tarasov, M. R. Mordkovich, V. F. Gordeyev, T. L. Zayets and Yu. Ye. Babskaya, Institute of Surgery imeni A. V. Vishnevskiy, USSR Academy of Medical Sciences, Moscow]

[Abstract] The goal of this study was to determine the degree of protein assimilation in burn patients who were subjected to graded high caloric gastric gavage using radionuclide diagnostic methods based on I-albumin. Possible connection between absorbing ability of the intestines and protein metabolism indices was studied on 21 individuals (10 patients with II-IV degree burns and 11 apparently normal volunteers). It was shown that, in comparison to controls, the burn cases showed considerable variation and an actual decreased assimilation of protein; there appeared to be a direct relationship between protein assimilation and absorbing ability of their intestines. Positive dynamics of protein metabolism could be assured by this method. It was also shown that the radionuclide method used here was reliable, informative, non-toxic and safe. Figure 1; references 11: 8 Russian, 3 Western.

7813/12955
CSO: 1840/083

EFFECTS OF UV-BLOOD IRRADIATION ON PULMONARY FREE RADICAL LIPID PEROXIDATION
IN ISCHEMIC HEART DISEASE

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE,
KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 9, Sep 86
(manuscript received 11 May 86) pp 74-77

[Article by K. S. Ternovoy, academician, UkrSSR Academy of Sciences, Yu.
Yu. V. Rozhnov, Yu. P. Butylin, Yu. M. Sakun, Yu. I. Bobylev, V. N. Ivanov,
P. B. Koval and G. G. Babich, IVth Gl. Ukr. [expansion unknown], Ukrainian
SSR Ministry of Health, Kiev]

[Abstract] Various biochemical indicators pertaining to free radical lipid peroxidation were monitored in 40 aged males with ischemic heart disease (including 18 with massive infarcts) in relation to the therapeutic effectiveness of UV (254 nm) blood irradiation and reinfusion (0.5-1.5 ml/kg). Comparison of the lipid levels, antioxidants, and peroxidation products in arterial and venous blood demonstrated that optimal therapeutic effects in patients without myocardial infarction were seen in 5 days after the last of 5 reinfusions. Maximum therapeutic effectiveness was obtained 10 days after an infarct following 5 reinfusions, which correlated with changes in lipid metabolism indicative of pulmonary surfactant recovery. The replenishment of surfactant facilitated normal or near normal gas exchange across the alveolar membrane as a result of the antioxidative effectiveness of UV blood irradiation. References 15: 12 Russian, 1 Roumanian, 2 Western.

12172/12955

CSO: 1840/080

UDC 576.895.421:576.858

EXPERIMENTAL INFECTION OF IXODID TICKS WITH KARSHA VIRUS

Leningrad PARAZITOLOGIYA in Russian Vol 20, No 5, Sep-Oct 86
(manuscript received 25 Feb 85) pp 347-350

[Article by V. A. Aristova, Ye. A. Gushchina, V. L. Gromashevskiy and
B. V. Gushchin, Institute of Virology imeni D. I. Ivanovskiy, USSR Academy
of Medical Sciences, Moscow]

[Abstract] Results are presented from virologic studies of ixodid ticks infected with the Karshi virus (Flavivirus, Togaviridae) by forced feeding. Two strains of the virus were used, isolated from ticks in Kazakhstan and subjected to ten passages through white mouse brain. The ticks were infected on a dosed feeding device, each tick receiving 0.1 to 0.5 μ l of a 20% virus-containing suspension, mixed with defibrinated white mouse blood, mixed in some experiments with 30% erythrocyte solution. Both strains of the virus survived in the ticks and reproduced. Electron microscope studies indicated that the virus enters the gut of the tick along with the blood of the host and reproduces at a rate dependent on temperature. Forty-six days after infection, viral particles are found in vacuoles in cells of the tick saliva glands as well as the gut. 1.5 to 2 months after infection, the viral antigen is found in the hemolymph malpighian vessels, reproductive organs and saliva glands. References 6: 4 Russian, 2 Western.

6508/12955

CSO: 1840/128

EFFECTS OF INHIBITORY CONCENTRATIONS OF NaCl ON GROWTH OF CANDIDA TROPICALIS IN CONTINUOUS CULTURE IN pH-STAT

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 14 May 84) pp 893-898

[Article by A. V. Furyayeva, M. G. Saubenova, O. M. Puzyrevskaya, U. S. Mukhamediyeva, G. I. Tushkova, T. I. Pisman and N. S. Pechurkin, Institute of Biophysics, Siberian Department, USSR Academy of Sciences, Krasnoyarsk]

[Abstract] Studies were conducted on the physiological differences between virgin and NaCl-adapted *Candida tropicalis* 29-10 cells when exposed to variable concentrations of the salt in continuous culture in synthetic medium in a pH-Stat. At pH 3 and a temperature of 35.5°C, increasing the NaCl concentration from 0 to 110 g/liter resulted in a reduction in the growth rate from 0.68 to 0.17 h⁻¹, in the economic coefficient (Y) from 40 to 16%, and in the level of stationary biomass by 1.7-fold. At pH 6.1, the growth rate increased to 0.22 h⁻¹ in the presence of 110 g/liter of NaCl, and, when supplemented with 3 g/liter of peptone, the rate improved to 0.28 h⁻¹. The latter findings point to the complex mechanism of inhibition exerted by the sodium and hydrogen ions. and the beneficial effects of an enriched nutrient environment. *C. tropicalis* cells 'adapted' to NaCl showed numerous physiological differences, including elevated intracellular concentrations of trehalose and glucan (2-fold), increased growth rate (1.3-fold), an increased economic coefficient (ca. 2-fold), diminished cell wall permeability to nucleotides (3-fold), and increased resistance to the toxic effects of copper ions. 'Deadaptation' by cultivation on NaCl-free media led to cells exhibiting 60% retention of NaCl-resistance (in terms of enhanced growth rate) after four passages on the salt-free media (ca. 100-150 generations). Figures 3; references 18: 15 Russian, 3 Western.

12172/12955
CSO: 1840/087

UDC 631.46:579.841.[11+91]-222.2

EXTRACHROMOSOMAL DNA-DETERMINED BIODEGRADATION OF PHENOL

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 28 May 84) pp 910-913

[Article by V. I. Korzhenevich and G. M. Shub, Saratov Medical Institute]

[Abstract] Cultures of soil bacteria were isolated and analyzed for their ability to degrade phenol, a process which resulted in the identification of *Alcaligenes faecalis* and *Pseudomonas alcaligenes* as possessing the desired metabolic capability. Both strains grew well on synthetic mineral media with phenol (1 mg/ml) as the sole source of carbon and energy. The

metabolic steps in both cases involved opening of the aromatic compound via formation of cis,cis-muconic and beta-ketoadipic acids as intermediate products. Ability to biodegrade phenol was subject to spontaneous loss, as well as to loss following treatment with acridine orange or mitomycin C in subbacteriostatic concentrations. In addition, in mixed cultures *A. faecalis* was capable of donating its capacity for phenol degradation to *E. coli* and *Ps. putida*. Agarose gel electrophoretic studies resulted in the demonstration that biodegradation of phenol was due to a 30-40 megadalton extrachromosomal DNA. References 20: 6 Russian, 14 Western.

12172/12955
CSO: 1840/087

UDC 579.841.11.017.735

DIPHENYL CATABOLISM BY PSEUDOMONAS PUTIDA BS 893 CONTAINING BIODEGRADATION
PLASMID pBS241

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 7 Mar 84) pp 914-918

[Article by I. I. Starovoytov, S. A. Selifonov, M. Yu. Nefedova and
V. M. Adanin, Institute of Biochemistry and Physiology of Microorganisms,
USSR Academy of Sciences, Pushchino]

[Abstract] Further metabolic studies were conducted on the diphenyl-degrading bacterium *Pseudomonas putida* BS 893 (pBS241), which resulted in the demonstration that biodegradation by this agent leads to benzoic, m-hydroxybenzoic and cinnamic acids. The latter two metabolites represent a unique feature of *Ps. putida* (pBS241), in that they are not formed by other diphenyl-degrading bacteria. In addition, the plasmid pBS241 imparted high levels of catechol-1,2-oxygenase activity to *Ps. putida*, which exceeded 2-fold that in the plasmid-free strain, and of catechol-2,3-oxygenase activity which was lacking in the absence of the plasmid. References 12: 3 Russian, 9 Western.

12172/12955
CSO: 1840/087

FORMATION OF HETEROKARYONS BY MORPHOLOGICAL MUTANTS OF TRICOTHECIUM ROSEUM

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 28 Jun 84) pp 930-934

[Article by Ye. M. Ryazanova, Ya. V. Flyakh and V. V. Sukhodolets, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] Various morphological mutants of *Trichothecium roseum* 1844 induced by UV irradiation were grown in mixed culture to assess the level of heterokaryon formation. The descriptive data indicated that the morphological mutants differed in their ability in this respect, with some showing greater propensity for heterokaryon formation than others. In the majority of cases the heterokaryon forms were intermediate in antibiotic production, a problem encountered in industrial production of antibiotics from the fungi imperfecti. However, studies on heterokaryons and the conditions leading to their formation are valuable in that they allow genetic analysis of the fungi imperfecti. Figures 1; references 14: 8 Russian, 6 Western.

12172/12955
CSO: 1840/087

UDC 579.841.11.017.7

OXIDATION OF n-ALKANES BY PSEUDOMONAS AERUGINOSA BEARING PLASMID pBS251

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 2 Jul 84) pp 944-947

[Article by A. L. Andreyeva, A. P. Ilchenko and A. M. Boronin, Institute of Biochemistry and Physiology of Microorganisms, USSR Academy of Sciences, Pushchino]

[Abstract] Physiologic studies on *Pseudomonas aeruginosa* PA08 showed that the cells were incapable of growth on C₆-C₁₂ n-alkanes or the corresponding alcohols. However, cells bearing the hybrid plasmid pBS251 (derived from RP4) were able to utilize the n-alkanes as the sole source of carbon. The metabolic studies were consonant with the view that pBS251 controlled initial stage of n-alkane oxidation via control of inducible hydroxylases and dehydrogenases, whereas the subsequent steps were under the control of constitutive enzymes. The primary conclusion reached was that oxidation of octane and other short-chain n-alkanes in *Ps. aeruginosa* (pBS251) proceeds via the monooxygenase system without involvement of cytochrome P-450 as a terminal carrier. Figures 1; references 9: 3 Russian, 6 Western.

12172/12955
CSO: 1840/087

OXIDATION OF HYDROGEN BY IMMOBILIZED RENOBACTER VACUOLATUM

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 6 Jun 84) pp 960-963

[Article by D. I. Nikitin and O. I. Slabova, Institute of Microbiology,
USSR Academy of Sciences, Moscow]

[Abstract] Studies were conducted with the hydrogen bacterium *Renobacter vacuolatum* to determine the effects of immobilization on its viability and metabolic activity. Immobilization in 10% polyacrylamide gel did not affect its ability to oxidize hydrogen in various gas mixtures (25-70% H₂; air). In addition, full metabolic capacity was retained for a period of 17 months from the time of preparation when stored in a refrigerator at 4°C. In distinction to free cells, the immobilized cells produced CO₂ in the course of hydrogen oxidation at the expense of endogenous heterotrophic reserves. Figures 4; references 7: 4 Russian, 3 Western.

12172/12955
CSO: 1840/087

UDC 582.282.23:57.082.56

SELECTION AND STORAGE OF ACID-TOLERANT YEAST STRAINS

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 12 Jun 84) pp 1011-1014

[Article by Ye. A. Andreyeva, O. P. Blinova and I. L. Rabotnova, Institute of
Microbiology, USSR Academy of Sciences, Moscow]

[Abstract] Continuous cultivation of *Candida utilis*, *C. lambica* and *Endomyces magnusii* yeasts in a chemostat with gradually decreasing pH from 4.5 to 2.0 was employed as a technique for selection of acid-tolerant strains. The approach was successful in the selection of strains capable of high growth rates (0.45-0.60 h⁻¹) at pH 2.0-2.2, with further selection possible for strains showing optimal growth under such conditions. Strains tolerant of extreme acidity were readily stored in liquid media at pH 1.7-2.0 and 1-10°C for up to 4 months without reculturing, and for a further period of time after one to two passages. Figures 3; references 6: 5 Russian, 1 Western.

12172/12955
CSO: 1840/087

VARIABILITY IN PHYSIOLOGICAL AND BIOCHEMICAL PROPERTIES OF BACILLUS
THURINGIENSIS SBSP. THURINGIENSIS FOLLOWING GROWTH IN SOIL

Moscow MIKROBIOLOGIYA in Russian Vol 54, No 6, Nov-Dec 85
(manuscript received 31 Jul 84) pp 1019-1020

[Article by A. G. Kolchevskiy and A. Ya. Leskova, All-Union Scientific
Research Institute of Agricultural Microbiology, Leningrad]

[Abstract] An evaluation was made of the persistence of a number of physiological and biochemical characteristics of entomopathogenic *Bacillus thuringiensis* subsp. *thuringiensis* 202 following 1 to 2 years of culture in different types of soil. After 1 year of culture in the various types of soil, the proteolytic activity of 26% of the isolates increased, while the amylolytic activity of 15% of the isolates diminished. After 2 years of cultivation in peat-podzolic soil, 11% of the isolates lost the ability to produce the crystalline endotoxin which accounts for the insecticidal activity of *B. thuringiensis*. After a comparative period of time, 27% of the isolates in superficial podzolic soil showed a similar loss, and 11% of the isolates that had been maintained in prairie-peat soil. Amylolytic activity decreased in 9 to 36% of the isolates, depending on the soil type, and proteolytic activity increased in 50-55% of the isolates. In addition, 12% of the isolates from the peat-podzolic soil and 9% of the isolates from superficial podzolic soil failed to form surface films on meat peptone broth medium. These observations indicate that bacilli used in plant protection undergo pronounced physiological and biochemical changes in the soil. Antigenic characteristics, however, were found to be some of the most stable elements of *B. thuringiensis*. References 7: 5 Russian, 2 Western.

12172/12955
CSO: 1840/087

UDC 612.392.99:612.395.12

CHANGES IN HUMAN BODY FUNCTIONS UPON INGESTION OF READY MADE FOOD CONCENTRATES

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 86
(manuscript received 25 May 85) pp 30-33

[Article by E. P. Tsyganov, A. N. Agureyev, Ye. V. Kolchin, V. S. Dupik
and A. A. Gubernatorov (Moscow)]

[Text] When making small size rations (SSR) of food for individual needs, ready for use or for emergency stock (for geologists, tourists and others), it is necessary to consider several factors. Of these the three most important are: 1) the necessity to contain energy- and nutrition-rich food in a small unit of mass, 2) the length of time and convenience of storage, and 3) the durability and reliability of the packaging. We think the SSR can best be made from food concentrates if these three factors are considered. It is possible to obtain a product with the required ratio of food ingredients in very small-sized packs. As a rule, SSR are required to satisfy the body's basic energy and nutrition needs. Considering the need to use them sparingly in real-life situations, these rations may be classified as low-calorie food. Developing and improving an SSR with an optimal ratio of basic food ingredients is an urgent unresolved problem of food hygiene.

The aim of this research was to study changes in the body functions of volunteers who consumed ready-to-use food concentrate briquettes packed as single-portion SSRs. In the scientific literature one finds a rather limited amount of work devoted to this topic (1, 2, 4, 5).

Eight healthy, physically-trained men, 19 - 20 years old, weighing 72 - 97 kg, 177 cm tall on the average, participated in this study. In the initial phase of the experiment they received a ration of fresh food which consisted of 105 g protein, 93 g fat and 687 g carbohydrates, with a caloric value of 4112 Kcal. The subjects' weight remained stable. Then, for three consecutive days they received SSR made of 12 separate concentrated food briquettes (6 different kinds, 2 briquettes of each kind). The total weight of the ration was 600 g. All the test volunteers received one tablet of the multivitamin "Hexavit" as a supplement to their diet. The ration was vacuum-packed, wrapped in three layers of polymer material (cellophane, foil and polyethylene). Table 1 shows the basic food ingredients and energy value of the briquettes. Each briquette weighed 50 g.

(1) Таблица 1

(2) Содержание основных пищевых веществ (в г) и энергетическая ценность брикетов концентратов

| (3) Брикет концентратов | (4) Белок | (5) Жиры | (6) Углеводы | Энергетическая ценность, ккал (7) |
|---------------------------------------|-----------|----------|--------------|-----------------------------------|
| (8) Мясной с сыром | 16,87 | 7,08 | 17,20 | 209 |
| (9) Яичный с мясом | 21,90 | 5,27 | 14,49 | 202 |
| (10) Сырный сладкий | 4,80 | 0,91 | 38,75 | 188 |
| (11) Кофейно-молочный | 6,99 | 6,28 | 30,61 | 214 |
| (12) Молочный с плодово-ягодным соком | 4,77 | 0,34 | 39,33 | 185 |
| (13) Молочный сладкий | 3,79 | 0,10 | 45,03 | 202 |

- 1) Table 1
- 2) Basic food content (in g), and energy value of the food concentrate briquettes
- 3) Briquette description
- 4) Protein
- 5) Fats
- 6) Carbohydrates
- 7) Energy value, Kcal
- 8) Meat with cheese
- 9) Eggs with meat
- 10) Sweet cheese
- 11) Coffee and milk
- 12) Milk with berry-fruit juice
- 13) Sweet milk

The distinguishing feature of the ratio is that it uses natural products of the dehydration and freeze drying process from the native [Soviet] industry. Satisfaction of the energy and plastic requirements of the body is achieved basically, from the protein and carbohydrates. The low fat content assures an extended shelf-life (2 years).

The SSR contained 118.4 g protein, 39.9 g fat and 370.8 g carbohydrates, an energy value of 2400 Kcal. The rations were divided into 3 meals every day, 4 briquettes of various types per meal. The briquettes were consumed along with unrestricted amounts of drinking water. In a normal, basal period, energy consumption amounted to 3600 - 3850 Kcal/24 hrs, as determined by the chronometric method. The energy deficit, when SSR were used, amounted to 1200 to 1450 Kcal/24hrs.

Several physiological methods were used to assess the functioning of the human body when SSRs were fed. Physiological studies included daily measurement of body weight, arterial blood pressure, heart rate, dynamometry and the performing of orthostatic and step tests. At the end of every day, the subjects recorded information about their general fitness, ability to work, degree of fatigue, sleep and appetite characteristics, functioning of their gastro-intestinal track, amount of water needed, a general appraisal of the day's food, and so on. Statistical analysis was used in processing the results. To establish the validity of the changes, non-parametric criteria were used.

The average weight loss of the subjects fed with SSR was 0.77 kg on the first day, 0.22 kg on the second and 0.19 kg on the third day. The total weight loss was 1.18 kg for three days on the SSR diet. The comparatively larger weight loss for the first day can possibly be attributed to the dehydration of the test subjects in that time.

In the volunteers' personal opinion, they felt satisfaction throughout the observation period. They felt they had had enough food on the first day, but not enough on the subsequent days of the experiment, and they experienced hunger at the end of their work day. They consumed the whole ration, and they highly prized the taste qualities of its ingredients (on a 5-point grading scale, the taste of the individual concentrates was graded between 4.3 and 5.0). A poll of the subjects indicated that they favored the briquettes with the most variable content. At each meal they drank from 200 ml to 500 ml water, and during the whole day they consumed 600 - 1500 ml of water.

While living on SSR the subjects experienced neither a decrease in work ability, nor an increase in fatigue. They slept well. Their gastro-intestinal track presented no problems except for a lack of bowel movement among the majority of men during the first day on the SSR diet, and an increased density and decreased volume of the feces in all the men on the subsequent days.

The medical examinations and physiological tests revealed substantial changes in body functions of the test subjects. The arterial blood pressure, the heart rate, the indexes of dynamometry and physiological functions remained unchanged before and after the experiment. Physical work capacity, according to PWC₁₇₀ index, was slightly increased on the third day of the SSR diet. These data served as a proof that the cardio-respiratory function not only remained intact, but functioned well despite the inadequate food supply.

(1) Таблица 2

(2) Изменение физической работоспособности при выполнении степ-теста при питании МГР в течение 3 дней ($\bar{X} \pm m$)

| (3) Показатель | (4) Фоновый период | (5) Срок наблюдения, сутки | | |
|---------------------------------|--------------------|----------------------------|-----------|-----------------|
| | | (6) 1-я | (7) 2-я | (8) 3-я |
| (9) ЧСС: | | | | |
| (10) после 1-й ФН | 90±4 | 90±5 | 93±4 | 93±4 |
| (11) после 2-й ФН | 121±5 | 117±6 | 116±5 | 117±5 |
| (12) PWC ₁₇₀ , Вт/кг | 3,58±0,26 | 3,93±0,31 | 4,35±0,37 | 4,20±0,21* (13) |

(14) Примечание. Здесь и в табл. 3: ЧСС — частота сердечных сокращений, ФН — физическая нагрузка. Звездочка — $p < 0,05$ по сравнению с фоновым периодом.

- 1) Table 2
- 2) Changes in physical work capacity occurring during the step test in the subjects maintained on SSR diet for 3 days
- 3) Index
- 4) Initial period
- 5) Time of observation, in days
- 6) First day
- 7) Second day
- 8) Third day

- 9) FHC [heart rate]
- 10) After 1-st WL [work load]
- 11) After 2-nd WL [work load]
- 12) PWC₁₇₀ Watt/kg
- 13) Asterisk: $p < 0.05$ denotes a probability as compared to the basal period.
- 14) Note: Here, as well as in Table 3, FHC = frequency of heart contractions
WL = Work Load.

When an active orthostatic test was performed (Table 3), a certain increase in the average heart rate was observed as the subjects' position was changed from supine to upright on the second and third days of the SSR diet. Also, a certain change in pulse and average arterial blood pressure was observed on the second day; however, the above changes were not statistically significant, and therefore it can be said that orthostatic stability had not changed during the SSR diet. The skin and mucous membranes retained normal appearance throughout the experiment. No allergic reactions were observed. None of the men experienced any sickness, including ordinary colds. A similar set of results was obtained when the same experiment of 3 days of the SSR diet was repeated two days later.

(1) Таблица 3
(2) Изменение ортостатической устойчивости при питании МГР в течение 3 дней ($\bar{X} \pm m$)

| (3) Показатель | (4) Фонозный период | (5) Срок наблюдения, сутки | | |
|-------------------|---------------------|----------------------------|---------|---------|
| | | (6) 1-е | (7) 2-е | (8) 3-е |
| (9) ЧСС лежа | 56±2 | 58±3 | 56±2 | 58±3 |
| (10) АД лежа: | | | | |
| (11) минимальное | 61±1 | 62±2 | 61±2 | 62±2 |
| (12) максимальное | 116±2 | 117±3 | 117±3 | 114±3 |
| (13) пульсовое | 55±2 | 55±2 | 56±2 | 52±2 |
| (14) среднее | 79±3 | 80±3 | 80±2 | 79±3 |
| (15) ЧСС стоя | 73±3 | 75±4 | 81±4 | 79±3 |
| (16) АД стоя: | | | | |
| (17) минимальное | 74±2 | 74±2 | 73±3 | 74±3 |
| (18) максимальное | 112±3 | 109±3 | 104±2 | 107±3 |
| (19) пульсовое | 38±2 | 35±2 | 31±2 | 33±1 |
| (20) среднее | 87±3 | 86±2 | 83±3 | 85±3 |

(21) Примечание. АД — артериальное давление.

- 1) Table 3
- 2) Change in orthostatic stability in subjects fed an SSR diet for 3 days
- 3) Index
- 4) Initial stage
- 5) Time of observation, in days
- 6) First day
- 7) Second day
- 8) Third day
- 9) Supine FHC
- 10) Supine ABP
- 11) Minimum
- 12) Maximum
- 13) Pulse
- 14) Average

- 15) Upright FHC
- 16) Upright ABP
- 17) Minimum
- 18) Maximum
- 19) Pulse
- 20) Average
- 21) Note: ABP = arterial blood pressure

Therefore, the experimental results serve as proof that there were no changes in health and no significant alteration in the studied functional indexes of the subjects maintained for 3 days on a diet of Small Size Rations, in ready-made concentrated briquettes designed for individual use.

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13131/12955

CSO: 1840/082

UDC 615.2/.3.036.8.076.9:616.831-005.4-092.9-02:612.014.447-063

USE OF GRAVITATIONAL OVERLOADS AS A SCREENING PROCEDURE IN RESEARCH ON NEW BIOLOGICALLY ACTIVE AGENTS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 49 No 1, Jan-Feb 86
(manuscript received 19 Sep 84) pp 101-102

[Article by M. D. Gayevyy, Pharmacology Department, Pyatigorsk Pharmaceutical Institute]

[Text] Longitudinal gravitational overloads created by a centrifuge are known to cause disturbances of cerebral circulation, the degree and nature of which depend on the magnitude and vector of acceleration [3,4,6].

A craniocaudal acceleration vector (positive radial acceleration) causes shifting of blood caudad, as a result of which pressure in vessels of the brain decreases, causing ischemia in the former.

Caudocranial gravitational overloads (in the negative radial direction) also significantly increase pressure in the brain's circulatory system; hypoxic congestion phenomena, damage to the hematoencephalic barrier and cerebral hemorrhaging are observed.

The degree to which cerebrovascular disturbances manifest themselves in response to both positive and negative accelerations depends on the magnitude and duration of the overload and on the gradient of its growth and decline, which makes it possible to dose such overloads. The objective indicators defining the state of animals experiencing gravitational overloads are arterial pressure, the EKG, cerebral blood flow, respiration, brain bioelectric activity and so on. But it is procedurally difficult to obtain this information during centrifugation. For the purposes of screening new compounds we can limit ourselves to considering survival of animals previously receiving the agent under analysis (once or several times) in comparison with control.

White rats are best suited for such research. They exhibit a rather clear dependence between survival and the magnitude of overloads [7]. The experimental and control animals must be of the same sex, weight and age, and they must be maintained in identical conditions.

Results of the greatest objectivity can be obtained with simultaneous centrifugation of control animals and experimental animals (animals receiving the preparation). For this purpose, several specimens of both types of animals are placed in separate containers. Each container is divided into several longitudinal cells, each lined with porolon or foam rubber. The cell volume should correspond to the size of the animal, and it should not allow it to deviate voluntarily from the set acceleration vector.

A centrifuge for such research can be manufactured in any laboratory. Recommendations on this question, and the basic requirements on conducting research using a centrifuge may be found in the literature [2,5]. Numerous studies conducted in our laboratory [1] revealed that this screening method is a highly informative and productive means of finding new biologically active agents intended to correct cerebrocirculatory disorders.

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CSO: 1840/038

COMPARATIVE STUDY OF INDIVIDUAL AND COMBINED EFFECTS OF TRENTAL, MENTHOL, AND OBSIDAN ON CARDIO-RESPIRATORY SYSTEM OF OPERATORS UNDER EXTREME CONDITIONS

Moscow FARMAKOLOGIYA I TOKSIKOLOGIYA in Russian Vol 49, No 5, Sep-Oct 86
(manuscript received 17 Feb 86) pp 89-90

[Article by L. D. Makoyeva, Ye. D. Li, K. A. Memetov, T. F. Belinskaya, V. A. Musev and A. G. Margaryan, Department of Internal Medicine No. 2 (Head, Professor L. L. Orlov), Moscow Medical Institute im. N. A. Semashko]

[Text] The presence of humans in a state of weightlessness, and particularly their return to normal terrestrial gravitation are associated with a rearrangement of respiratory, psychic, and autonomic areas of activity [1-4]. The data available to date do not allow us to determine conclusively how hazardous these hypokinetic disturbances may be. In that connection, there is considerable interest in the possible prevention and treatment of disorders caused by restricted respiratory activity in antiorthostatic hypokinesia.

Research methods

The basic parameters of central hemodynamics and gas exchange were ergometrically tested in 11 healthy male operators aged 30 to 40 years. The effect that various pharmacological preparations had on these indices was studied.

Physical load capacity was tested on a Elema veloergometer by step-wise increments in loads up to a submaximum pulse rate (75 percent of the maximum). Each increment stage was performed for four minutes. Gas exchange indices were read on a Spirolit-2 apparatus, and arterial pressure was measured by the Korotkov method.

The extent of changes in myocardial contractility, left ventricular dimension, and cardiac output during the pharmacological tests was evaluated by echocardiography on a SKI Ekolaine-20A echocardiograph through the use of the generally recognized Feigenbaum procedure. The transducer was placed on the fourth-fifth intercostal to the left of the sternum and attached there by a special device for the remainder of the examination. A first day recorded echocardiogram served as the background. The echocardiogram recorded on the second day followed the oral

administration of 100 mg of trental and 8 mg of obsidan. On the third day, recordings were made after 100 mg of trental and four drops of a three-percent solution of menthol administered at the first, third, and sixth hours of antiorthostatic hypokinesia at a 15° angle. On the fourth day 500 mg of l-DOPha [l-dihydroxyphenylalanine] and 80 mg of obsidan, and on the fifth day recordings were made after the administration of 50 mg of cordan as well as at the peak of the submaximal load and after a 10-minute rest. The echocardiograms were used to compute the following indices: end systolic volume (V_s) and end diastolic volume (V_d), stroke volume (V_{st}), and minute volume (V_{min}), ejection fraction (EF), relative contraction of the lesser axis in systole ($\Delta S\%$), contractile force velocity (V_{CF}), and total peripheral resistance. A total of 99 echocardiograms were analyzed.

Results and Discussion

On the day of the background recordings the pulse rate in nine out of the eleven test subjects reached the submaximal frequency at a load of 800 kgm/min. In the remaining two subjects the submaximal frequency was reached at a load of 1,000 kgm/min. The average pulse rate for the groups was 154.0 ± 5.4 beats per minute. There was practically no change in the resting pulse rate following a single dose of trental with menthol. A tendency toward a pulse rate decrease (by 5.3%, $P < 0.01$) was noted during physical stress. Combinations of trental and obsidan, and of l-DOPha and obsidan resulted in a noticeably smaller rise in the pulse rate at the same stress load than a combination of trental and menthol. The pulse rise coefficient upon physical stress decreased by 26.4 and 16 percent respectively. There was also a more significant decrease in systolic arterial pressure (by 22 percent). The decrease in diastolic arterial pressure was insignificant.

Cordan exhibited the same negative chronotropic effect as did obsidan which was manifested in a 16-percent reduction in the pulse rate increment coefficient upon physical stress. Cordan's hypotensive effect was less pronounced. There were no significant differences between total performance on the initial background day and performance after the administration of various preparations. The increase in oxygen demand was greatest upon the administration of l-DOPha and obsidan (24%, $P < 0.01$), and least upon the administration of the other preparations (7 -- 8%, $P < 0.05$).

The energy cost per unit of work increased significantly after the administration of l-DOPha and obsidan (by 23%, $P < 0.05$) and by eight to ten percent respectively ($P < 0.05$) upon the administration of the other preparations. Consequently, the administration of the indicated preparations, particularly l-DOPha, resulted in increased oxygen demand and inefficient oxygen consumption during physical stress.

Oxygen debt in the test subjects increased but was greater upon the combined administration of l-DOPha and obsidan, and somewhat less when cordan was administered. The efficiency index in a background of various preparations did not change significantly, and any differences were not statistically reliable.

The basic indices of central hemodynamics at rest on the background day corresponded to the generally accepted norm. Changes in all indices were observed upon the presentation of a submaximal load which corresponded to the normal physiological response to stress.

All of the indices returned to the original values during the 10-minute rest period, although the observed insignificant increase in cardiac minute volume may have been related to the higher number of cardiac contractions in comparison to those at rest.

The basic central hemodynamic indices recorded in the ergometric test after the administration of cordan did not significantly differ from the background indices. The same general characteristic changes in all indices were noted at peak maximal load as were noted on the background day. All the parameters returned to the initial values in the recovery period. One should note that V_{st} at the peak load and during the recovery period was lower than it was on the background day. This is possibly due to cordan's negative ino- and chronotropic effect.

The changes observed after the administration of trental and menthol during the ergometric test were the same as those observed on the background day at rest and during submaximal load. A slower recovery of central hemodynamic indices was observed during the recovery period which was simultaneously accompanied by an insignificant increase in cardiac contractions in comparison to the background level.

When l-DOPha and obsidan were administered at rest there were insignificant changes (increases) in S_s , S_d , V_s , V_d , and V_{st} in comparison to the background data.

The hemodynamic indices at peak physical load did not significantly differ from the background values, although the slight decrease in V_{min} could have been due to obsidan's negative ino- and chronotropic effect. The hemodynamic indices in the recovery period also did not significantly differ from the background values, although there were insignificant increases in V_{st} and V_{min} . The increase in V_{min} may have been due to the increase in cardiac contractions in comparison to the resting values.

There was a reliable decrease in V_{min} , FF, and ΔS during the ergometric test following the administration of trental and obsidan at peak submaximal load. This is apparently explained by obsidan's negative ino- and chronotropic effect. The indices returned to the initial values during the recovery period.

Conclusions

A significant increase in cardiorespiratory stress was noted after a six hour-period of antiorthostatic hypokinesia induced by the administration of preparations related to a group of β -blockers. This was manifested in an inadequate increase in oxygen demand and inefficient oxygen consumption during physical stress performance.

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6289

CSO: 1840/045

COMPUTER-ASSISTED CLINICAL EVALUATION OF DRUGS

Moscow FARMAKOLOGIYA I TOKSILOGIYA in Russian Vol 49, No 5, Sep-Oct 86
(manuscript received 17 Feb 86) pp 116-117

[Article by S. G. Kobaladze, A. N. Ioseliani, S. G. Markozashvili and T. R. Tsirikidze, Department of Internal Medicine No 1 (Head, Professor S. G. Kovaladze) of the Pediatrics, Sanitation-Hygiene and Stomatology Faculty of the Tbilisi Medical Institute]

[Text] The ever-increasing number of new drugs today makes it difficult to choose a medicinal substance rationally in each specific instance. It is therefore extremely important to undertake a comprehensive qualitative and quantitative study of the comparative efficacy of drugs.

At the same time the huge volume of clinical and laboratory data cannot always be interpreted by the physician, and particularly by the young specialist.

The method we propose will make it easier for the practicing physician to select therapeutic drugs. The structure of the computer program is designed for a quantitative evaluation of the comparative efficacy of drugs for various diseases and provides for the classification of information by a number of criteria: 1) age (the five age groups classified by the WHO), 2) sex, 3) diagnosis, and 4) drug preparation.

The program's selective options provide for a multi-staged processing of data.

Data are processed in two stages. The first stage entails the traditional statistical processing of data and reliability tests by the Student and Fisher criteria. Moreover, the program's modular structure makes it easy to change the volume and character of the processing.

The second stage entails a quantitative evaluation of a preparation's efficacy based on drug appraisal and statistical reliability data.

The appraisal evaluations are structured in the following pattern:

1. An appraisal evaluation matrix A_{jk} is compiled, where k is the disease code, j is the index code. The element of this matrix a_{jk} is the weighted significance coefficient of j index for a k -disease (the significance or weight of the index is understood to mean the degree of information it provides for a given disease). The value a_{jk} is in the interval $0 \leq a_{jk} \leq 1$, where 0 indicates an index's complete lack of information about a given disease, and 1 indicates maximum information.

The final value a_{jk} is found by the conventional averaging of values suggested by several expert appraisers (experienced clinicians).

2. The value of the efficacy coefficient of a j -index is computed for the selected k -disease and the drug being used by the formula:

$$\gamma_{ji}^k = 1 - \frac{|X_{jin}^k - X_{jn}|}{|X_{jin}^k - X_{jn}|}, \quad (1)$$

where X_{ji}^k is the j -index prior to treatment; X_{ji}^k is the j -index after treatment; and X_j is the index for a healthy person, i.e., the norm.

The final efficacy of a drug for k -disease is found by the formula:

$$\gamma_i^k = \sum_{j=1}^n \frac{a_{jh}}{\sum_{j=1}^n a_{jh}} \cdot \gamma_{ji}^k. \quad (2)$$

The resultant found efficacy makes it possible to select the most rational approach to treatment in each specific instance.

In conclusion, it should be noted that this study is a first attempt to design a quantitative evaluation of a drug's efficacy. Equations (1) and (2) may be modified by additional information and further elaboration. This should in principle cause no difficulties in programming.

At the same time the method suggested here will provide for the compact storage of clinical and laboratory data for each patient and their usage for further processing.

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6289

CSO: 1840/045

NOMINATION OF NEUROGENIC DISEASE THERAPY FOR STATE PRIZE

Moscow IZVESTIYA in Russian 13 Aug 86 p 3

[Article by V. Vasilenko, academician, USSR Academy of Medical Sciences, Hero of Socialist Labor: "Man is Indivisible: Competition for the State Prize"]

[Text] "Treat the patient, not the illness." This precept has existed in our medicine for many years and is based on classical works. What is the main point of the theory of neuroses, whose founders were I. Sechenov, S. Botkin, I. Pavlov, L. Orbeli and other outstanding scientists of ours? It is that the nervous system plays a decisive role in the life of a sick and healthy person. Man is an entity; he cannot be divided. Science can presume this division only hypothetically. Unfortunately, medical men sometimes forget this.

The theory of neurosis has been enriched in our times by one other work by a group of scientists from the Research Institute for Experimental Medicine of the USSR Academy of Medical Sciences and the Military Medicine Academy imeni S. M. Kirov. For two decades, this group, which included pharmacologists and clinicians, persistently studied neurogenic mechanisms of damage to internal organs with an original pharmacological analysis method. The scientists also created new approaches to specialized synthesis of chemicals acting on the higher nerve centers and on peripheral branches of the nervous system.

The authors did not simply trace the nervous system's involvement in the development of illnesses. They showed how this happens. For many years, it was accepted to think that, in neurogenic ailments of internal organs, especially the stomach, pathological reflexes were restricted to higher branches of the central nervous system -- to the cerebral cortex. It has now been discovered that the process takes place not on the level of the cortex, but the subcortex. That this fact has been reliably established is of tremendous significance. The use of chemicals to suppress this subcortical zone has made it possible to prevent neurogenic damage to the stomach. One such chemical, well known to doctors, is phenobarbital.

Besides higher branches of the nervous system, sympathetic nerves play an active role in the development of neurogenic ailments. They help

accelerate release of norepinephrine and other mediators into tissue. Then, as it was discovered, there is a sharp drop in the release of these substances which leads to cell damage and exhaustion. The scientists' establishment of these phenomena was an event in medical science. It is recorded as a discovery by the USSR State Committee for Inventions and Discoveries.

If there are excessive loads on the nervous system, metabolism in tissue cells is rather quickly damaged, and other important processes are disrupted.

All these data were obtained for the first time by the authors of this work. The discovery of these mechanisms is not of an abstract nature. In the first, acute, state of the development of a neurogenic illness -- whether myocardial infarction or liver or pancreas trauma -- chemicals which stimulate release of adrenaline and the activity of the sympathetic nervous system cannot be used. On the contrary, this activity must be blocked.

When the acute phase of the illness is past, the activity of the sympathetic nerves must be sustained and increased. This is also achieved using native [Soviet] medicines.

The new understanding of the course of neurogenic ailments has made it possible to reconsider the customary tactics of medicine. With the new procedure, prospects for care after heart operations and for myocardial infarction are much more favorable. Healing of stomach ulcers has improved in cases when customary treatment did not yield good results.

I believe that the cycle of work "Neurogenic Mechanisms of Gastroduodenal and Cardiovascular Pathology and Experimental Clinical Substantiation of a New Approach to Pharmacotherapy for These Disturbances by Neurotropic Means" is a major contribution to domestic medicine. On its merit, it has been entered in the competition for the USSR State Prize.

12809/12955
CSO: 1840/1285

UDC 615.281.6+615.277.3]:547.854.4

STUDY OF ANTI-METABOLITE PROPERTIES OF ANOMERIC 5-SUBSTITUTED 2'-DESOXYURIDINES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 6, Jun 86
(manuscript received 8 Apr 85) pp 649-655

[Article by T. P. Nedorezova, G. I. Potapova, C. Ya. Melnik and M. N. Preobrazhenskaya, All-Union Oncological Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] A study of the effect of 14 alpha- and beta-anomers of 5-substituted 2'-desoxyuridines on incorporation of labelled precursors in DNA of hepatoma 22A of C3HA mice in vitro and in vivo and in DNA of chick fibroblasts, growing on a monolayer, before and after infection by herpes simplex virus and of their effect on thymidine-kinase, desoxycytidine kinase and pyrimidine nucleoside phosphorylase is described and discussed. All of the beta-anomers inhibited incorporation of 2'-desoxycytidine into DNA in a 200 mg/kg dose in vivo. Both alpha- and beta-anomers are competitive inhibitors of desoxycytidine. None of the compounds were split by pyrimidine nucleoside phosphorylase, isolated from human and animal tissues. Alpha-anomers of 5-trimethylsilyl-2'-desoxyuridine and trimethylgermyl-desoxyuridine suppressed incorporation of desoxyuridine into DNA at concentrations much lower than was the case for incorporation of thymidine. Figures 2; references 18: 8 Russian, 10 Western.

2791/12955
CSO: 1840/051

SYNTHESIS AND BIOLOGICAL ACTIVITY OF BIS[p-HEXYLOXYPHENYL]-ALKANDIONES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 6, Jun 86
(manuscript received 28 Mar 8 [last digit omitted]) pp 664-667

[Article by L. M. Petrosyan, G. A. Gevorkyan, K. G. Samvelyan, A. A. Chachoyan, E. V. Kazaryan, B. T. Garibdzhanyan and O. L. Mndzhoyan, Institute of Precision Organic Chemistry imeni A. L. Mndzhoyan, ArSSR Academy of Sciences, Yerevan]

[Abstract] Dioximes of bis(p-hexyloxyphenyl)alkandiones were obtained by condensation of bis(p-hexyloxyphenyl)alkandiones and hydrochloric hydroxylamine and their anti-tumoral and anti-bacterial activity was studied and described. The compounds were practically non-toxic with $LD_{100}^{4500-5000}$ mg/kg. The anti-tumoral activity of the compounds on solid tumors depended upon the length of the carbon chain. A study of their anti-bacterial activity on a model of an infection (caused in white mice by intraperitoneal injection of staphylococcus) showed that the compounds were practically ineffective after a single dose of 1000 mg/kg. References 2 (Russian).

2791/12955

CSO: 1840/051

COMPARATIVE STUDY OF ACTH₄₋₁₀ ANALOGS--LEARNING AND MEMORY STIMULATION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 6, Jun 86
(manuscript received 15 Mar 85) pp 667-670

[Article by M. A. Ponomareva-Stepnaya, V. D. Bakharev, V. N. Nezavibatko, L. A. Andreyeva, L. Yu. Alfeyeva and V. N. Potaman, Institute of Molecular Genetics, USSR Academy of Sciences, Moscow]

[Abstract] Several ACTH₄₋₁₀ analogs were synthesized by the classical method of peptide chemistry with the use of 1-benzotriazole and the compounds obtained were studied in tests for elaboration of avoidance of punishment reflex in mongrel rats (180 ± 20g) in a 3-section, U-shaped labyrinth and their effect on memory consolidation and learning retention was determined. The most active after a 150 mcg/kg subcutaneous injection was heptapeptide ACTH₄₋₇-pro-gly-pro. Reduction of the subcutaneous dose to 25 mcg/kg did not reduce the activity of the compound while the other compounds become partially or completely inactive at this dosage. The minimum dose for intra-abdominal injection at this dosage. The minimum dose for intra-abdominal injection was 3 mcg/kg. This compound also produced a more prolonged effect than the other compounds studied. References 4 (Russian).

2791/12955

CSO: 1840/051

CHOLINE ESTERS OF N-SUBSTITUTED AMINO ACIDS. PART 2. SYNTHESIS OF
DIALKYLAMINO ALKYL ESTERS OF N-SUBSTITUTED ALPHA, BETA-DEHYDRO-AMINO ACIDS

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 6, Jun 86
(manuscript received 16 Apr 85) pp 675-679

[Article by V. O. Topuzyan, D. A. Gerasimyan, A. S. Edilyan and L. O. Mndzhoyan, Institute of Fine Organic Chemistry imeni A. L. Mndzhoyan, ArSSR Academy of Sciences, Yerevan]

[Abstract] Dialkylaminoalkyl esters of N-substituted alpha and beta-dehydro-amino acids were synthesized by interaction of azlactones with apposite amino alcohols. Saturated azlactone reacted with 2-(dimethylamino)-1-ethanols more quickly than apposite unsaturated ones. Iodomethylates and hydrochloride of dialkylaminoalkyl esters of N-benzoylamino acids were synthesized and their cholinergic activity was studied on isolated frog rectus abdominus muscle. The capacity of the compounds to counteract acetylcholine contraction (the choline-blocking effect) was demonstrated. References 9: 5 Russian, 4 Western.

2791/12955
CSO: 1840/051

COMPUTER-ASSISTED ANALYSIS OF LARGE NUMBER OF COMPOUNDS WHICH POSSESS
PSYCHOTROPIC ACTIVITY. PART 7. USE OF MOLECULAR DESCRIPTORS FOR RECOGNIZING
KIND OF PSYCHOTROPIC ACTIVITY

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 6, Jun 86
(manuscript received 5 Apr 85) pp 705-710

[Article by A. S. Kabankin, A. P. Bondareva and M. A. Landau, Scientific Research Institute for Biological Testing of Chemical Compounds, Moscow Oblast]

[Abstract] More than 100 molecular descriptors which describe the joined atomic fragments, conformational mobility and degree of cyclicity were calculated for 116 psychotropic compounds related to one of five groups (19 soporifics, 21 tranquillizers, 36 neuroleptics, 18 antidepressants and 22 psychostimulators). Optimum combinations of the descriptors which ensure the best placement of the compounds in one of the five groups were determined by step-wise discriminant analysis. Discriminant functions possessing the best prognostic capacity were selected by use of a sliding control. A program of linear discriminant analysis with sliding control, developed for a BESM-6 computer, is described and discussed. References 9: 7 Russian, 2 Western.

2791/12955
CSO: 1840/051

RADIATION-CHEMICAL CONVERSIONS IN MONOCARBOXYCELLULOSE DERIVATIVES EXPOSED TO IONIZING RADIATION IN DOSES UP TO 5 Mrads

Moscow FARMATSIYA in Russian No 3, May-Jun 85
(manuscript received 27 Sep 84) pp 31-34

[Article by B. G. Yasnitskiy, V. A. Oridoroga, L. M. Oridoroga, Ye. P. Pavlov and E. G. Tushov, All-Union Scientific Research Institute of Chemistry and Technology of Drugs, Kharkov]

[Abstract] The goal of this study was to determine the effect of radiation doses used to sterilize monocarboxycellulose (MCC) preparations on their composition and quality and to evaluate the potential of such sterilization under industrial conditions. The study was performed using gauze with up to 15% water content, packed in glass containers or in polyethylene pouches. Irradiated samples were analyzed for the content of carboxyl (CG) and aldehyde (AG) groups. It was shown that exposure to radiation at doses 0.2 to 5 Mrads led to dose-related oxidative processes resulting in increased content of CG and AG; the specimens darkened considerably and their tear-strength dropped significantly. This was due to the presence of water, because when dehydrated specimens were exposed to the same radiation levels under identical conditions, there were no changes observed in the MCC preparations after irradiation. Therefore, this method was recommended for sterilization of sealed packages of MCC preparations. Figures 2; references 8: 2 Russian, 6 Western.

7813/12955
CSO: 1840/090

GAS CHROMATOGRAPHIC DETERMINATION OF ARPENAL AND GANGLERON

Moscow FARMATSIYA in Russian No 3, May-Jun 85
(manuscript received 28 Sep 84) pp 35-37

[Article by F. D. Dauletbakova, M. K. Starchevskiy and V. F. Kramarenko, Lvov Medical Institute]

[Abstract] Arpenal and gangleron are used as spasmolytic agents. Qualitative analysis of these drugs in the past was based on photolorimetric, titration and spectrophotometric methods. In this paper, a gas chromatographic method is described for qualitative and quantitative analysis of these drugs using methylsilicon oil (SP-2100) or polymethylphenylsiloxan (OV-17) as the stationary liquid phase deposited on solid chromaton N super (0.125-0.16 mm mesh, 3% concentration). Flame ionization and heat conductivity detectors were used. Retention times on SP-2100 were 5.48 and 5.03 min, while on the Ov-17 they were 8.1 and 5.3 min for arpenal and gangleron, respectively. Figures 2; references: 9 Russian.

7813/12955
CSO: 1840/090

EFFECT OF ETHIMIZOL ON NEUROMUSCULAR SYNAPSE OF FROG

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 6, Nov-Dec 85
(manuscript received 26 Nov 84) pp 757-763

[Article by T. M. Drabkina and M. G. Dobretsov, Leningrad University imeni A. A. Zhdanov]

[Abstract] Ethimizol facilitates processes of consolidation of memory in mammals and accelerates the development of conditioned reflexes. The substance is probably a nonspecific connector which operates on the cholinergic system of the brain, possibly facilitating synaptic transmission. To achieve an understanding of the mechanism of the influence of ethimizol on memory processes, this article studies the effect of ethimizol on the neuromuscular junction of the frog, a model of central cholinergic synapses. Experiments were performed at room temperature, recording the membrane potential of the muscle fiber. Spontaneous miniature potentials of the terminal plate and evoked potentials of the terminal plate evoked by stimulus. The presynaptic effect of ethimizol is described and it is suggested that its significance as a memory activator may be related to an increase in the effectiveness of synaptic transmission at low initial levels of liberation of the mediator. If ethimizol increases the level of cyclic nucleotides and intracellular Ca^{2+} in the presynaptic nerve endings, this may stimulate the basis of plastic restructuring, the basis of acceleration of memory and development of conditioned reflexes. The increase in the time interval in the post-synaptic potential may also support more favorable conditions for time and space summation of excitation. Figures 4; references 12: 10 Russian, 2 Western.

6508/12955
CSO: 1840/071

UDC 612.73+612.815

ULTRASTRUCTURAL LOCALIZATION OF APAMIN BINDING SITES ON GUINEA PIG INTESTINAL SMOOTH MUSCLE

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 6, Nov-Dec 85
(manuscript received 1 Apr 85) pp 824-827

[Article by S. V. Vasilenko, S. V. Komissarenko, N. V. Prochukhan, T. B. Gerasimova and K. P. Zak, Institute of Biochemistry imeni A. V. Palladin, Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Apamin, the honey-bee venom neurotoxin, is the only known neurotoxin acting on the central nervous system. The neurotoxic activity of apamin is related to two cation charges on the side chains of Arg¹³, Arg¹⁴. An attempt made earlier to localize the bonding site of apamin by autoradiography using ¹²⁵I-apamin failed due to a high level of nonspecific binding. The

present work therefore attempted to localize the bonding site of apamin at the ultrastructural level by immunocytochemical methods and electron autoradiography. The results indicate that only methods of immunoenzymocytochemistry have sufficient sensitivity for adequate solution of the problems. It is established by these methods that the binding site of apamin is located primarily on the sarcolemma of smooth muscle cells and in nerve endings. Figures 3; references 13: 5 Russian, 8 Western.

6508/12955
CSO: 1840/071

UDC 615.243.4.015.4

MECHANISM OF INITIAL STAGE OF IONOL BIOTRANSFORMATION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 15 Apr 85) pp 784-787

[Article by I. A. Degterev, A. A. Buzukov, K. N. Popov, V. Yu. Pakhomov, A. M. Serebryanny and G. Ye. Zaikov, Institute of Chemical Physics, USSR Academy of Sciences, Moscow, Scientific Research Institute of BIKhS, Moscow Oblast]

[Abstract] Wistar rats (2 months old, weight 120-140 g) receiving a 100 mg/kg or 400 mg/kg dose of ionol perorally and untreated control rats were used in experiments to determine the mechanism of the initial stage of ionol biotransformation in rat liver microsomes. The rats were decapitated 24 hours after the last dose. The study showed the presence of two autonomous pathways of ionol biotransformation. One pathway of ionol biotransformation is realized completely by an enzymic, probably cytochrome-dependent, mechanism and the other is associated with oxidation of the benzene ring. Comparison of findings of this study with previous studies of ionol biotransformation in mice showed some species differences in the mechanism at both the quantitative and qualitative levels. References 16: 2 Russian, 14 Western.

2791/12955
CSO: 1840/049

ANALYSIS OF STRUCTURE-ACTIVITY CONNECTION ON BASIS OF PRINCIPLE OF STRUCTURAL CORRESPONDENCE WITHIN FRAMEWORK OF RECEPTOR LATTICE MODEL

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 23 May 85) pp 791-794

[Article by V. Ye. Kuzmin and S. V. Krutius, Physical Chemistry Institute imeni A. V. Bogatskiy, UkSSR Academy of Sciences, Odessa]

[Abstract] An approach to the study of activity of biologically active compounds as a function of structural parameters which reflect the mutual correspondence of the receptor and effector, based on the principle of structural correspondence, is described and discussed. The approach involves use of a lattice model of the receptor space, in which are delineated regions facilitating binding with effector, regions preventing it and indifferent regions. The algorithm realizing the approach is discussed in detail in a sequence of 10 steps. The algorithm is realized in a complex of STERFIT (STERIC FIT) program for a YeS-computer in FORTRAN-IV algorithmic language. Figure 1; references 13: 6 Russian, 7 Western.

2791/12955

CSO: 1840/049

UDC 615.31:547.872/.873].017:615.355:577.152.042.2

SIMULATING INHIBITING ACTIVITY OF BAKER'S TRIAZINES ON BASIS OF STRUCTURAL CORRESPONDENCE PRINCIPLE

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 23 May 85) pp 794-799

[Article by S. V. Krutius and V. Ye. Kuzmin, Physico-Chemical Institute imeni A. V. Bogatskiy, UkSSR Academy of Sciences, Odessa]

[Abstract] A study of some Baker's triazines which inhibit dehydrofolate reductase, within the framework of a lattice model of the receptor, included procurement of correlation equations connecting the activity with the effectors' structural parameters characterizing correspondence or non-correspondence of the cavity receptor effector. More than 40 such polylinear equations were analyzed. The prognosticating capacity of the equations was discussed. Receptor charts were analyzed and active and inactive positions of substituents in the benzene nucleus of the Baker triazines were determined. The model adequately describes the interconnection of Baker triazines structure and their inhibiting activity and may be used for semi-quantitative assessment of the activity. Figure 1; references 5: 1 Russian, 4 Western.

2791/12955

CSO: 1840/049

IMADAZOLE-4[5]-CARBOXYLIC ACID AMIDES. EFFECT ON MEMORY AND LEARNING PROCESSES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 22 May 85) pp 799-802

[Article by L. B. Piotrovskiy, M. A. Dumpis and P. D. Shabanov, Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad]

[Abstract] Synthesis of 4(5)-(N-methylcarbamyloxy)imidazole (I) 4(5)-(N,N-dimethylcarbamyloxy)imidazole (II) and 4(5)-N-(1-methyl-2-phenylethyl)carbamyloxy imidazole (III) was carried out to further study the dependence of the biological action on chemical structure in the series of imidazole-carboxylic acids derivatives. Experiments were performed on 52 male mongrel rats (wt 200±20 g), deprived of water for 48 hours and trained for elaboration of a conditioned drinking reflex. Compounds I, II, and III were injected intraperitoneally in doses equal to 1/20 LD₅₀ (50, 30 and 5 mg/kg respectively) daily 30 minutes before elaboration and extinction of the drinking reflex. Compound I accelerated the rate of learning the reflex, compound II did not affect it and compound III decreased the rate of learning it. Effectiveness of learning was unchanged after use of compounds I and II. Compound I did not affect the rate of extinction of the reflex but compound II increased the rate and effectiveness of the reflex. The effect of compound III on extinction of the reflex was not studied because of its ineffectiveness in intensifying the learning process in the rats. The capacity of compound II to selectively accelerate active extinction while not affecting learning has not been found in other compounds used in psychoneuropharmacology products. References 12: 6 Russian, 6 Western.

2791/12955
CSO: 1840/049

BIOLOGICAL ACTIVITY OF 1-AROXYLITRANS AND 1-AROXYLITRAN-3-ONES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 25 Feb 85) pp 815-818

[Article by V. B. Kazimirovskaya, L. A. Mansurova, T. P. Torshina, T. V. Nefedova, Ye. V. Bakhareva, L. A. Ageyeva, P. Khenchey, Y. Nad and M. G. Voronkov, Irkutsk Institute of Organic Chemistry, Siberian Department, USSR Academy of Sciences, Budapest Technical University, Hungary]

[Abstract] Toxicity, erythrocyte resistance, functional activity of thrombocytes, coagulological parameters, biochemical indicators of granulation-fibrous tissue and pilotropic activity of 1-aroxyilitrans and 1-arylsilitran-

3-ones were studied in experiments on mice, rabbits, rats and guinea pigs. The most active of the compounds studied is 1-(3-chlorophenoxy)silatran. In low concentrations, it stabilized erythrocyte and thrombocyte membranes, shifted coagulation parameters toward hypercoagulation, improved biochemical indicators of granulation-fibrous tissue and displayed pilotropic activity. The results showed the advisability of further study of the biological activity of 1-aroxy-silatrans and especially that of 1-(3-chlorophenoxy)silatran. References 17: 13 Russian, 4 Western.

2791/12955
CSO: 1840/049

UDC 615.849.1.015.25:547.857.012.1

SYNTHESIS AND STUDY OF RADIO-PROTECTIVE PROPERTIES OF SULFUR-CONTAINING DERIVATIVES OF NATURAL PURINE METABOLITES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 19 Apr 85) pp 839-842

[Article by G. N. Krutovskikh, G. F. Gornayeva, L. P. Vartmanyanyan, Kh. L. Muravich-Aleksandr and V. G. Pernikova, Central Scientific Research Roentgenoradiological Institute, Leningrad]

[Abstract] A study of radio-protective properties of 2-thio-7-methyl derivatives of adenine, hypoxanthine, 6-thioguanine and their analogs was described and discussed. Exposure of female mongrel mice (weight 18-24 g) to a single 7 Gr dose of x-rays was used to determine the radio-protective properties of the synthesized compounds. Toxicity of the compounds was determined in unexposed mice by the Litchfield and Wilcoxon method. Compounds pertaining to derivatives of adenine and 6-thioguanine increased the survival rate of irradiated mice by 35-40 percent, on the average, while all control animals died. The other compounds studied were ineffective. References 8: 4 Russian, 4 Western.

2791/12955
CSO: 1840/049

SYNTHESIS AND BIOLOGICAL ACTIVITY OF DERIVATIVES OF CARBOXYLIC ACIDS, HAVING SULFUR-CONTAINING GROUPS IN BETA-POSITION

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 5 Feb 85) pp 843-847

[Article by V. V. Znamenskiy, A. D. Yefremov, V. M. Yvstrova, T. P. Vasilyeva and O. V. Kildisheva, Institute of Biophysics, USSR Ministry of Health, Institute of Element Organic Compounds, USSR Academy of Sciences imeni A. N. Nesmeyanov, Moscow]

[Abstract] A study of reactions of cyclic anhydrides of beta-sulfincarboxylic acids (1,2-oxathiolan-5-one-2-oxides and 2,1-benzoxathiol-3-one-1-oxide) with nucleophilic reagents is described and discussed. The reactions proceed with destruction of the O-CO bond. Sulfinates obtained were compared with carboxylic acids derivatives containing a bivalent sulfur atom in the beta-position. Infra-red and paramagnetic resonance spectra of the synthesized substances are presented and discussed. Radio-protective effectiveness of the compounds was studied in experiments on F (CBAXC57Bl) mice (weight 19-23 g). The combination of a sulfonate group and a carboxylic group in one molecule is less effective than the combination of sulfinat and tri-sulfide groups but the search for new radio-protectors among bi-functional sulfinat compounds is warranted. References 9: 4 Russian, 5 Western.

2791/12955
CSO: 1840/049

UDC 615.014.6:678

PURPOSEFUL VARIATION OF DIMENSIONS OF NANOPARTICLES--CORPUSCULAR CARRIERS OF ACTIVE SUBSTANCES

Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 20, No 7, Jul 86
(manuscript received 18 Apr 85) pp 863-865

[Article by Ye. G. Matveyeva, E. V. Shtykova, A. V. Levashov, V. M. Shlimak and G. Ya. Rozenberg, Central Scientific Research Institute of Hematology and Blood Transfusion, USSR Ministry of Health, Moscow; Moscow University imeni M. V. Lomonosov]

[Abstract] Photon-correlation spectroscopy was used to determine the Stokes radii of cross-linked polyacrylamide particles obtained by polymerization of acrylamide in reversed micelles of OT aerosol in toluene with different degrees of hydration of the micelles. The radius of the particles increased from 18-32 nm with the increases of the degree of hydration of the micelles. The size of the polyacrylamide particles obtained by polymerization in reversed micelles also depended upon the acrylamide concentration. Use of alpha-chemotrypsin as a model biologically-active substance, covalently

immobilized in polyacrylamide nanoparticles, showed that enzymes incorporated into polyacrylamide particles maintain their catalytic activity and have high stability. The small dimensions of the particles (10ths of an nm) and the possibility of continuous, smooth variation of the radius of the particles by a simple method are quite important for use of polymer particles in medicine as carriers of biologically active substances and medicines. Figures 3; references 11: 3 Russian, 8 Western.

2791/12955

CSO: 1840/049

UDC 612.832:612.434.14

EFFECT OF VASOPRESSIN AND OXYTOCIN ON BACKGROUND ACTIVITY OF DORSAL HORN
CELLS FROM ISOLATED NEWBORN RAT SPINAL CORD

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 3, May-Jun 85
(manuscript received 28 Apr 84) pp 314-320

[Article by Z. A. Tamarova, Institute of Physiology imeni A. A. Bogomolets,
Ukrainian SSR Academy of Sciences, Kiev]

[Abstract] Vasopressin and oxytocin are produced by the large cells of the paraventricular and supraoptical nuclei of the hypothalamus. The axons of these cells reach the spinal cord. Fibers containing vasopressin and oxytocin descend in the spinal cord to its sacral segments and terminate in the dorsal horns, central gray matter and intermediate lateral nuclei, forming axo-dendritic and axo-somatic contacts. The presence of such projections indicates that vasopressin and oxytocin may act directly on the cells of the spinal column. The purpose of this work was to study the influence of vasopressin and oxytocin on the cells of the dorsal horn, including cells in the origin of the ascending paths. This article presents results of studies concerning the effect of vasopressin and oxytocin on background discharges of unidentified cells of various plates in the dorsal horn. Experiments were performed on isolated spinal columns of newborn rats. Experimental data indicate that vasopressin and oxytocin can change the background activity of cells of the dorsal horn, most neurons reacting by decreasing frequency of discharge. Vasopressin inhibited background discharges in 74% of the cells, exciting only 26% of neurons which responded. Oxytocin inhibited 67% of cells, exciting 33%. The concentrations of the substances were at least 30 to 50 times greater than the concentrations of these substances in the cerebrospinal fluid of the rats. It was demonstrated that in the area where vasopressin- and oxytocin- containing fibers terminate synaptically, these peptides can be liberated under the influence of depolarization caused by potassium or veratridin, and the process is Ca^{2+} -dependent. Figures 4; references 17 (Western).

6508/12955
CSO: 1840/068

INFLUENCE OF VASOPRESSIN AND OXYTOCIN ON EVOKED ACTIVITY OF DORSAL HORN CELLS
IN ISOLATED SEGMENT OF NEWBORN RAT SPINAL CORDS

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 5, Sep-Oct 85
(manuscript received 26 Nov 84) pp 634-640

[Article by Z. A. Tamarova, Institute of Physiology imeni A. A. Bogomolets,
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[Abstract] Experiments on an isolated segment of the spinal cord of 2-to-3-week-old rats studied the influence of vasopressin and oxytocin on the activity of dorsal horn cells evoked by stimulation of an afferent root. The focal potential was recorded, reflecting the summary activity of a number of cells in the immediate vicinity of the microelectrode tip, as well as the action potential of individual cells evoked by stimulation of the dorsal root. The work was performed on an isolated spinal cord segment placed on a bipolar platinum electrode isolated from the solution by vaseline. Stimulation was with rectangular current pulses at 1 to 10 times the threshold determined from the appearance of the afferent wave, detected by means of a glass microelectrode at the entry of the root into the dorsal horn. It was found that the hypothalamic neuropeptides have a primarily depressing effect on transmission of afferent pulses by the dorsal horn cells studied. This is indicated both by experimental data in which focal potentials evoked by stimulus of the dorsal root were recorded, and by the use of leads to individual cells. The postsynaptic component of the focal potential was depressed by vasopressin by 33-39%, by oxytocin -- by 12-32% relative to the initial level. This depression of evoked potentials indicates that vasopressin suppresses the transmission of afferent impulsation in the spinal cord. The increase in the pain threshold in intact animals upon administration of vasopressin may result from the depression of the pain afferent flux at the dorsal horn interneuron level. Figures 5; references 8: 2 Russian, 6 Western.

6508/12955
CSO: 1840/070

MORPHOLOGICAL AND FUNCTIONAL ORGANIZATION OF BRAIN AS MATERIAL SUBSTRATE OF PROBABILITY PREDICTION

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 86
(manuscript received 30 Aug 85) pp 53-66

[Article by D. A. Shiyayev and I. R. Kalva, Latvian Scientific Research Institute of Experimental and Clinical Medicine, Latvian SSR Ministry of Health]

[Abstract] Largely Soviet literature is reviewed on the functional and morphological brain substrates involved in formulation of predictive ability as an important component of goal-oriented activity. Such ability underlies efficient energetic and functional tuning of the psychophysiological systems in anticipation of variation in activity. Several anatomic components have been identified as being involved in predictive processes, including the prefrontal areas of the neocortex, the hippocampus, amygdala, thalamus, etc. In general, such activity requires morphofunctional patency of such systems as the frontal cortex-hippocampus-caudate nucleus, frontal cortex-hippocampus-amygdaloid nucleus, frontal cortex-hippocampus-thalamus, and others. The problem is further complicated by hemispheric asymmetry and the unequal contribution of the various structures under different mental states. In addition to the ascending and descending pathways, further complexity is introduced by lateral interconnections that add additional refinements to the control mechanisms. Figures 3; references: 74: 56 Russian, 18 Western.

12172/12955
CSO: 1840/059

INTERRELATIONSHIP BETWEEN PSYCHOPHYSIOLOGICAL CHARACTERISTICS OF PROBABILITY PREDICTION AND FUNCTIONAL ASYMMETRY IN HUMANS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 86
(manuscript received 7 Feb 86) pp 115-119

[Article by V. N. Yanson, Z. F. Dayya and V. A. Zholud, Institute of Philosophy and Law, Latvian SSR Academy of Sciences]

[Abstract] A probability situation was employed to test sensorimotor responsiveness in 18-30 year old males and females with functional asymmetry. The subjects were divided into right-handed individuals with strong left-hemispheric (group I) and weak left-hemispheric (II) dominance on the basis of verbal-manual interference, and tested for bimanual responsiveness to a light stimulus preceded at -2 sec with a binaural warning signal. A 400 Hz warning signal had a probability of 0.25 of being followed by the light

stimulus, and the 500 Hz a probability of 0.75. In all phases of the study the manual response time of group I subjects was shorter than of group II subjects to a statistically significant degree. Group I subjects showed no difference in the response time between high or low probability warning signals, whereas in group II subjects the response time was far better with the 500 Hz signal. In addition, the latter group also presented with a higher pulse rates ($P < 0.01$) throughout the experiment. These observations were interpreted to indicate that the more forceful interhemispheric association in group II subjects retarded formulation of a bimanual sensorimotor response, that such subjects functioned at a higher level of neuropsychic tension, and that they also functioned more efficiently in probability assessment. Figures 1; references 14: 13 Russian, 1 Western.

12172/12955
CSO: 1840/059

UDC 612.821.3

PHYSIOLOGICAL SIGNIFICANCE OF CHANGES IN HUMAN BRAIN DISCHARGE FREQUENCY DURING SINGLE MENTAL EVENTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 289, No 5, Aug 86
(manuscript received 24 Feb 86) pp 1276-1280

[Article by Academician N. P. Bekhtereva, Yu. L. Gogolitsyn and S. V. Pakhomov, Scientific Research Institute of Experimental Medicine, USSR Academy of Medical Sciences, Leningrad; Leningrad Institute of Information and Automation, USSR Academy of Sciences]

[Abstract] A basically new approach has been developed to the analysis and interpretation of evoked changes in neuron discharge frequency upon presentation of individual stimuli or psychological test problems to test subjects. The approach is based on approximation of the neuron discharge frequency dynamic curve in individual actualizations by means of a sum of bell-shaped components, each described by its own latent period, amplitude and length. An effective algorithm is suggested for performance of the task of approximation of the curve, based on natural assumptions concerning the properties of the vector describing an individual component, allowing automatic selection of the number of components to be used in an expansion in order to provide the required approximation accuracy. Figures 3; references 9: 2 Russian, 7 Western.

6508/12955
CSO: 1840/060

BACKGROUND AND EVOKED ELECTRICAL ACTIVITY OF SEPTAL AND HIPPOCAMPAL TRANSPLANTS IN RAT NEOCORTEX

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 2, Mar-Apr 85
(manuscript received 24 Jan 84) pp 160-168

[Article by A. G. Bragin and O. S. Vinogradova, Institute of Biological Physics, USSR Academy of Sciences, Pushchino-on-Oka]

[Abstract] Electrophysiological studies were conducted on the behavior of septal and hippocampal transplants from 17 day Wistar rat embryos in Wistar recipients, 4-6 months after transplantation into the parietal neocortex. The mean background activity of the transplants was on the order of 3.6 ± 0.4 discharges/sec, comparable to the activity of control neurons (3.8 ± 0.4 discharges/sec). Electrical stimulation of the cortex evoked responses in 90% of the transplanted cells with a mean latent period of 17 ± 1 msec (5 to 43 msec), with maximum evoked potentials seen with stimuli in the 5-10 Hz range. In the majority of cases the evoked responses were followed by a 100 to 700 msec suppression period. In addition, the transplanted cells responded to various tactile stimuli with latent periods of 50 to 600 msec, with similar responses recorded from the adjacent recipient cortical tissue. These observations point to the successful structural and functional integration of the transplanted tissues in the adult rat brain, and the dominant influence of afferent impulses on the functional status of the transplants, which may provide a basis for future therapeutic approaches in CNS lesions. Figures 5; references 21: 6 Russian, 15 Western.

12172/12955
CSO: 1840/067

PATTERNS OF ELECTRICAL ACTIVITY OF THIN SLICES OF GUINEA PIG NEOCORTEX IN VITRO

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 4, Jul-Aug 85
(manuscript received 16 Apr 84) pp 441-449

[Article by S. V. Karnup, A. T. Bortnik and M. N. Zhadin, Institute of Biological Physics, USSR Academy of Sciences, Pushchino-on-Oka]

[Abstract] A study was conducted on the background pattern of electrical activity of neurons in thin slices (ca. 300-500 μ m) of guinea pig sensorimotor neocortex, to assess cortical function in the absence of afferentation. The resultant electrophysiological data led to the identification of 6 basic patterns of activity, which were then subjected to statistical evaluation. Pattern I consisted of regular, isolated discharges shown by 38.5% of the cells, with an interspike interval of 113.2 msec; pattern II consisted of

irregular spikes by 6.5% of the cells at 269.6 msec intervals; pattern III -- bursts of activity (6.5%; 4.4 msec); pattern IV -- mixture of bursts and single discharges (26.5%; 316 msec); pattern V -- group discharges (2.5%; 38 msec); and VI -- multineuronal volleys (18.5%; 8.0 msec). These observations point to the potential for pacemaker activity in cortical cells in situations with limited amount of gray matter and lack of afferent impulsion. Figures 3; references 16: 10 Russian, 6 Western.

12172/12955
CSO: 1840/069

UDC 612.825:612.815

EFFECTS OF INDIVIDUAL AND COMBINED APPLICATION OF NEUROTRANSMITTERS ON ULTRASTRUCTURE OF RAT BRAIN SYNAPSES

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 4, Jul-Aug 85
(manuscript received 19 Jul 84) pp 476-481

[Article by B. I. Kotlyar, G. G. Khludova, A. A. Myasnikov and Ye. V. Targulyan, Moscow University imeni M. V. Lomonosov]

[Abstract] Ultrastructural studies were conducted on the changes in synapses at the level of layer V in the sensorimotor neocortex of albino male rats in response to microionophoretic application of neurotransmitters. The resultant data demonstrated that combined application of sodium l-glutamate and norepinephrine led to a significant increase in postsynaptic density and a concomitant decrease in the quantity of synaptic vesicles in the terminals. A reduction in the number of synaptic vesicles was also obtained with either neurotransmitter alone. The data were interpreted to indicate that norepinephrine enhanced acetylcholine release. The increase in postsynaptic density seen with combined application of the neurotransmitters was taken to reflect the synergistic effects of glutamate and acetylcholine (the latter's release mediated by norepinephrine). Thus, increased osmophilicity of the postsynaptic formations may be regarded as a manifestation of molecular changes induced by the combined effects of glutamate and acetylcholine and, therefore, of the modulatory action of epinephrine. Figures 3; references 25: 16 Russian, 9 Western.

12172/12955
CSO: 1840/069

IN VITRO EFFECTS OF OPIOID PEPTIDES ON NERVOUS TISSUE

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 4, Jul-Aug 85
(manuscript received 16 Nov 84) pp 550-557

[Article by O. B. Ilyinskiy, M. V. Kozlova, Ye. S. Kondrikova, M. I. Titov, Zh. D. Bespalova, K. N. Yarygin and N. N. Yurchenko, Institute of Experimental Cardiology, All-Union Cardiology Scientific Center, USSR Academy of Medical Sciences, Moscow]

[Abstract] In vitro studies were conducted with several endogenous opioid peptides (gamma- and beta-endorphins, met- and leu-enkephalins) and 5 synthetic analogs of leu-enkephalin to assess their potential as growth stimulants of spinal and sympathetic ganglia explants obtained from 13-15 day old Wistar rat embryos. With the exception of one synthetic analog, all peptides evidenced growth stimulating activity with an increase in the number of glial and fibroblastoid elements in the growth zone. The peptides were active in a concentration range of 10^{-1} to 10^{-8} M, with the growth response to the 10^{-10} M concentration essentially equivalent to the effects obtained with the nerve growth factor in control studies. It appears, on the basis of these findings, that the endogenous opioid peptides may be involved in the growth and regeneration of neural elements. Figures 5; references 24: 6 Russian, 18 Western.

12172/12955
CSO: 1840/069

UDC 615.2/.3.014,45.002.237

IMPROVING QUALITY OF STERILE DRUGS PREPARED IN PHARMACIES

Moscow FARMATSIYA in Russian No 3, May-Jun 85 pp 25-30

[Article by V. V. Karchevskaya, I. V., Besedina, I. F., Sokolova, and N. I. Bessonova, All-Union-Scientific Research Institute of Pharmacy, Moscow]

[Text] Drugs in the form of solutions for injections and infusions are widely used today in the overall application of medicinal procedures. Their high degree of therapeutic efficacy is related to their direct entry into the patient's blood stream. The routes of administration dictate special quality requirements for this form of medication that include sterility, apyrogenicity, and the absence of any visible mechanical contaminants. More than one-half of the total parenterals produced in our country is prepared in hospital pharmacies where 60 to 70 percent of all extemporaneous prescriptions are prepared [12]. Nevertheless, for a variety of reasons the quality of pharmacy products does not always satisfy these high level requirements.

One should note that sterility and pyrogenicity control over solutions for injections that are prepared in pharmacies is presently extremely deficient, and requires intensification and further revision.

In this connection, attention must be focused on the manufacturing process conditions which must guarantee the quality appropriate to the manufactured product.

Inasmuch as the quality requirements for parenteral solutions are solely dependent upon the place of their manufacture (enterprises of the Ministry of the Medical Industry, pharmaceutical plants, and hospital pharmacies of therapeutic-prophylactic institutions), the requirements for their production procedures must be standardized.

The quality of parenteral solutions is affected by a whole series of factors, including the air in the production plant, manufacturing equipment, work clothes, etc. These items are usually the sources of solution contamination by mechanical and microbe particles which, as a rule, attach to dust particles 0.4 -- 0.5 μ in size. Thus, it has been established that a person constantly gives off aerosol particles whose number ranges from one thousand to 30 million per minute, dependent upon the nature of their mobility. Therefore, the number of personnel must be

limited in "sterile" work areas, and their activity must be strictly regulated.

Particular attention must be given to special clothing which must be sterile and serve as a barrier to aerosol particles discharged from personnel into the air of an aseptic unit. At the same time, this kind of clothing should be made out of fabrics with minimum frieze separation and no electrostatic charge [10].

At the All-Union Scientific-Technical Conference "Basic Directions for Improving the Quality of Parenteral Drugs" (Kaunas, 1983), a resolution was adopted on the manufacture of specialized clothing to be worn by personnel in aseptic areas. It would be advisable to provide this kind of clothing for pharmacy personnel engaged in the preparation of parenteral solutions.

Until recently pharmacies did not have any standard-technical documentation (NTD) which regulated the manufacture of parenteral drugs. In recent years the Laboratory for Pharmaceutical Technology and Polymers of the All-Union Scientific-Research Institute of Pharmacy, together with the Main Pharmaceutical Administration of the USSR Ministry of Health have been preparing manufacturing instructions for each individual parenteral product that specifically apply both to the given preparation and the individual stages of the product's manufacture and control. At the present time 10 sets of instructions have been approved for solutions that are most frequently used in clinical practice.

An identification of the most frequently prescribed drugs, and a study of the stability and shelf life of parenteral solutions prepared in pharmacies and the formulation of NTD based on those studies will doubtless enhance a higher quality of those products.

A general quality factor is the absence of any visible mechanical contaminants that enter the solution during the manufacturing process. The potential hazard of such particles is very considerable. On the basis of physicians' observations and animal experiments conducted abroad, it is generally known that foreign matter contaminants that enter a patient's body can cause thrombosis of the small capillaries, phlebitis, pyrogenic reactions, and local or general inflammation. Other possible complications include periarteritis, arteriosclerosis, allergic reactions, granular pulmonary inflammation, and even death. In addition, the administration of contaminated solutions may have delayed consequences [1, 18]. It is practically impossible to produce an absolutely pure solution. The degree of its purity is determined by the sensitivity and thoroughness of the control method. Thus, according to our data, a special analysis indicates that a "pure" solution from the viewpoint of a visual control contains a significant quantity of small invisible particles. At the same time, prepared parenteral products obtained from pharmacies often contain foreign matter particles of inadmissible size which could be detected by visual inspection.

All of this confirms the special role and responsibility of the manufacturing pharmacist and the dispensing pharmacist for the entire technological process of manufacturing and controlling parenterals as well as for the observance of regulations for working under aseptic conditions.

In connection with what has been stated above, considerable attention must be given to filtration stage and the subsequent control of solution purity.

There has been a recent trend in our country's national economy to replace technical grade natural filters for filters made out of various synthetic materials. This is due to the fact that the traditionally used filter materials (glass wool, gauze, filter paper) do not satisfy a number of requirements. For example, they swell, they are insufficiently inert and strong so that the materials tear and become contaminated. Other sectors of industry have started to use synthetic fibers made out of polyvinyl chloride, perlon, lavsan [Dacron], and polypropylene.

Studies in this area conducted at the All-Union Scientific-Research Institute of Pharmacy have shown the potential and promise of using molten polypropylene for filtering purposes in pharmacies. The material is inert, convenient to use and process, and is easily recovered so that it can be used repeatedly for fine purification of solutions. Personnel in a number of hospital pharmacies have had good results with experimental batches of this material. As early as 1981, the USSR Ministry of Health proposed its manufacture for pharmaceutical purposes to the USSR Ministry of the Chemical Industry. However, that question has not yet been resolved as of this date, and production of the material has not begun.

One way to improve the quality of parenteral solutions in pharmacies is to use membrane methods of purification, i.e., microfiltration [9]. This method provides for the reliable removal of both mechanical inclusions and microorganisms. Membrane filtration may be used as a method of sterilizing those solutions that cannot be sterilized by heat. These processes are being used particularly at enterprises of the medical industry that are primarily making use of foreign equipment and materials.

We have studied the domestic Vladipor membrane microfilters. These filters are white, small-pore films made out of cellulose acetate. They are inert and can be used for filtering solutions with a pH of from 1.0 to 10.0. The Vladipor microfilters were developed by the Institute for Synthetic Resins and are currently being manufactured by the Tasma production association in Kazan. In that connection, their products list includes special filters for medicinal solutions -- type MFA-A in two categories: No 1, sterilizing filters, and No 2, filters for the fine purification of solutions.

The problem of making apyrogenic parenterals in pharmacies is currently a very acute one. This mostly concerns solutions administered intravenously in large quantities (isotonic solution, sodium chloride, Ringer's solution, glucose, and various concentrations of sodium bicarbonate). The primary

source of solution pyrogenicity is the microorganic contamination of the starting materials (distilled water, drugs) and the environment (air, work clothes and equipment, and the hands of personnel).

It has been established that experimentally microorganism-contaminated IV solutions cause a clearly pronounced pyrogenic reaction in rabbits even after autoclaving. When these same solutions were preliminarily passed through a microfilter and sterilized in an autoclave, they were apyrogenic. Consequently, the use of micropore filters is quite effective for removing microorganisms from solutions subsequently sterilized by heat. In that connection, it is essential to initiate the use of membrane microfilters in filtering processes and filter equipment used for sterilizing parenterals. This will provide for the apyrogenicity and fully reliable purity of the solutions.

However, it must be emphasized that the possible use of the new filter materials is closely tied and directly related to process equipment. The equipment chart for pharmacies lists only the direct type of solution filtering equipment (AFRP) which was designed at the beginning of the '60s and which today no longer satisfies the higher requirements of parenteral solution manufacture and quality. As regards membrane filtration, there is no special domestically manufactured equipment for pharmaceutical purposes. In particular, type F-30 funnels manufactured for the bacteriological analysis of water could be used as filter rings.

The packaging and capping of filter-sterilized solutions require special efforts, primarily a laminar flow of sterile air. Our own domestic industry manufactures special table-chambers for supplying pure air. Pharmacies in particular may use the SMP-1 dust-proof table assembly whose test results allow us to recommend it for these purposes.

A no less important stage in the manufacture of parenteral products is purity control which is accomplished visually after filtration and after sterilization. Under optimal conditions this control method can detect particle sizes of 30 to 50, and even particles of 10. In connection with the hazard of mechanical contaminants directly entering a patient's blood stream, all 100% parenteral products must be thoroughly inspected. The essential conditions and technique of inspection are stipulated in "Provisional Instructions for Inspecting Parenteral Products for the Presence of Mechanical Inclusions." The inspection technique listed in the instructions requires the use of the UK-2 device for the visual control of pharmaceuticals [8] which most of the country's pharmacies currently have on hand. Also stipulated are the criteria for grading the purity of the solutions. Adherence to the requirements of the instructions will make it possible to organize a sufficiently good stage-wise control of parenteral purity in hospital pharmacies.

Sterility must constitute one of the obligatory requirements for parenteral solutions. This is accomplished by the use of contemporary sterilization methods. For aqueous parenterals this is done in steam sterilizers

saturated with water vapor under pressure at a temperature of 120°C. Rather wide use of such sterilizers for parenterals is presently the case in pharmacies where the treatment involves a vapor stream at 100°C. This method is unreliable, however, because it does not always guarantee the object's sterility. Therefore its use must be limited.

For a number of years the Institute of Pharmacy has been studying the possible sterilization of aqueous solutions of drugs found in pharmacies by steam pressure at 120°C in order to replace the flowing steam method of sterilization. That method has now been shown to be possible for many parenteral solutions. The need for further work in this area is also due to the fact that the steam flow method at 100°C has been eliminated as a sterilization method in the draft article "Sterilization" to be included in the 11th State Pharmacopoeia, in which the All-Union Scientific-Research Institute of Pharmacy directly participated.

While heat sterilization does result in a solution's sterility, in some cases it reduces the chemical stability of drugs. In addition, there still is a wide variety of parenterals that cannot withstand heat sterilization. These solutions are aseptically prepared in pharmacies and their shelf life is not more than one or two days. Besides a lowering of drug quality, this significantly complicates the work of practicing pharmacists.

The work of practicing pharmacists will be made much easier and the quality of parenteral products will be much improved by the development of stable forms of parenterals which can withstand heat sterilization, by an increase in the shelf life of parenterals, and by the formulation of recommendations for preparing the most frequently prescribed parenterals with a minimum shelf life of one month. In that connection, work in the area of drug stability is a vital task of research on sterile solution technology.

The resolution of that problem has been obstructed by the fact that recent work on drug stability in aqueous solutions has been of an empirical nature and the number of approved stabilizers has been extremely limited. There have been some recent studies on the protective action of antioxidants, based on contemporary theoretical concepts of organic compound oxidation [7, 16]. An understanding of the mechanism underlying antioxidant action will provide the prerequisites for a purposeful endeavor to find stabilizers, and by the same token reduce the amount of time and materials spent on developing stable drug forms.

At the present time, the mechanism underlying the protective action of a number of widely used stabilizers has been clarified, and new antioxidants have been found among medicinal substances, and the mechanism underlying their action has been identified [4, 5, 13]. This has also produced practical results. Thus, until recently, because of its instability, parenteral solutions of apomorphine HCl were prepared aseptically without heat sterilization and had a useful life of one to two days. As a result of purposeful research, a complex stabilizer was recommended for apomorphine. The stabilizer is composed of analgin [dipyrone], a substance

with anti-radical activity, and cysteine whose protective action is accomplished by the destruction of hydroxides formed when drugs undergo oxidation. Consequently, a 1%-parenteral solution of apomorphine hydrochloride with a useful life of three years was developed and introduced for commercial production. Instructions were also prepared for pharmacies to make this solution with a shelf life of one month.

Other problems yet to be resolved include the manufacture of other sterile solutions which heretofore are being prepared in pharmacies without heat sterilization (physiostigmine salicylate, hexamethylene tetramine, etc.) and increasing the useful life of many parenteral drugs (pyrodoxine HCl, norsulfazole, isoniazid, atropine sulfate, etc.). There are a number of solutions for which stable forms have been prepared but are difficult to make in pharmacies for a variety of reasons. Thus, the widely used 3% tuberculostatic sodium PAS solution is stabilized by rongalite. However, this stabilizer has a limited useful life (two months). Recommendations have been made to replace rongalite with anhydrous sodium sulfite. But these recommendations, like others that pertain to extemporaneous pharmacy compounding have not been approved by either the pharmacology nor the pharmacopoeia committees of the USSR. Apparently, when one stabilizer is suggested as a replacement of a generally recognized stabilizer, it is also necessary to prepare pharmacy instructions with the approval of the USSR Ministry of Health Main Pharmaceutical Administration.

In speaking about ways of improving the quality of parenteral solutions prepared in pharmacies, one cannot but help discuss questions related to the equipment used to produce good quality water for parenterals and the sterilization of solutions.

In accordance with the requirements of the 10th State Pharmacopoeia, water used for parenteral solutions must be devoid of pyrogens. However, at the present time there is only one apparatus produced in our country, the AEV-10, that guarantees the apyrogenicity of distilled water. In order to produce water of the required quality this apparatus has a rather complicated unit for preparing the water which is not normally used in pharmacies. In that connection, beginning next year it will be manufactured without the water-preparation unit and will be assigned the category of equipment for producing distilled water. Distillers for producing apyrogenic water (AEVS) with an output of 60, 25, and 4 liters per hour were designed and recommended for commercial production more than ten years ago by the Medoborudonaiye [medical equipment] scientific production association and the All-Union Scientific-Research Institute of Pharmacy [1, 5]. However, as of this date, that production has not yet been set up. The first commercial batch of only one of them, the AEVS-60, will come out in 1984. The total number to be produced is 10. In the following years, 150 units of each type will be produced annually. This is a completely intolerable situation. Water is the basic solvent in parenteral products and the lack of equipment to produce apyrogenic water will result in a drastic reduction in the quality of those medicinals.

Another no less important condition for improving the quality of parenterals is the reliability of sterilization.

Various types of series-produced steam sterilizers (GK-1, GK-100, VK-30, and others) are being used to sterilize solutions in pharmacies. However, that equipment is not specially designed for the sterilization of solutions, and therefore has a number of shortcomings. The equipment does not guarantee safe working conditions for the operating personnel and the length of the sterilization time is controlled visually, i.e., subjectively so that the time can be easily miscalculated.

At the present time steam sterilizers specially designed for solutions have been designed and recommended for series production [11]. These sterilizers have a forced cooling system which significantly reduces the operating cycle and the sterilization procedure is automated. However, they are intended for the sterilization of solutions in hermetically sealed 500 ml flasks only. The extensive introduction of steam sterilizers designed for the sterilization of solutions in various sizes of glass containers will be readily welcomed.

A significant portion of extemporaneous compounding in pharmacies is made up of ophthalmic solutions whose purity and preparation requirements are similar to those for parenterals.

However, in order to raise their quality, certain specific problems for this drug form will have to be resolved.

It would be advisable to standardize and reduce the number of ophthalmic solutions most frequently prescribed in ophthalmology practice. This should be followed by the compilation of a standard-technical compendium for those preparations.

Thus, analysis of extemporaneous compounding in cost-accounting pharmacies of Leningrad [3] has identified 12 versions of prescriptions containing ascorbic acid, iodide drops, sodium bromide, nicotinic acid, glucose, and citral with small differences in dosage and ingredients that are neither justified pharmacologically nor advisable from the economic viewpoint. An entire series of ophthalmic solutions cannot be thermally sterilized because of chemical instability and are therefore prepared aseptically. This method of preparation does not guarantee their sterility because the air and the hands of the pharmacy technician are sources of considerable microbe contamination [18]. In that connection, the introduction of membrane filtration as a method of sterilization should be given first priority.

The All-Union Scientific-Research Institute of Pharmacy has gained considerable experience in the use of membrane filtration for preparing ophthalmic solutions of 1% mezaton [phenylephrine HCl], 0.02% silver nitrate, 1% resorcinol, and 30% sodium thiosulfate [2]. The introduction of this method of sterilization in pharmacy practice will increase the

useful life of ophthalmic solutions which are currently prepared aseptically for use within one or two days. The sterility of ophthalmic solutions is important not only when they are dispensed but also when they are used and stored by the patient. This is accomplished by the addition of preservatives and the use of appropriate packaging.

Preservatives are widely used abroad in the manufacture of ophthalmic solutions which allow the patient to use them within one month [17]. A few studies in our country have been made in this area. The list of possible preservatives is very limited and we have practically no ophthalmic solutions that contain preservatives. It is also essential to design and introduce new advanced forms of packaging which will prevent contamination of a solution upon repeated use.

The resolution of the problems we have enumerated in the technique of preparing sterile solutions in pharmacies will doubtless contribute to their higher quality.

Conclusions

We have analyzed and summarized the factors that influence the quality of sterile solutions.

We have shown that improved quality of sterile solutions prepared in pharmacies is related both to an improvement in the manufacturing process and the standardization of manufacture regulations.

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CSO: 1840/089

HEARING AIDS IN CHILDREN WITH IMPAIRED HEARING

Kiev ZHURNAL USHNYKH, NOSOVYKH I GORLOVYKH BOLEZNEY in Russian No 5,
Sep-Oct 86 (manuscript received 3 Mar 86) pp 347-350

[Article by G. S. Lyakh and A. S. Rozenblyum, Department of Physiology and Pathology of the Ear, headed by Doctor of Medical Sciences A. S. Rozenblyum, Leningrad Scientific Research Institute for Diseases of the Ear, Nose, Throat and Speech, directed by Docent B. S. Krylov]

[Abstract] There is a tendency toward early application of hearing aids in persons with impaired hearing to avoid disruption of the stage of speech learning in the infant which cannot be later compensated. The authors analyzed information on the status of hearing aid assistance of children by carefully studying medical documents provided by parents of children brought to their institute. Data were analyzed on 1,000 children examined in 1984-1985. Seventy percent of the subjects were 2 to 7 years of age, 10% less than 2 years, 20% older than 7 years. In 55% of cases, hearing aids had not been prescribed, or, obsolete models had been used. In 330 cases in which modern hearing aids had been prescribed, they were in use in 100 cases, not in use in 230 cases. 100 children did not require hearing aids, information could not be obtained on 20 cases. Particular attention is given to the fact that 55% of the children were not supplied with modern hearing aids. A number of examples are presented indicating the error of the approach taken in these cases, in which workers thought that the children were too young, a hearing aid was not needed, etc. In the 23% of cases in which hearing aids were prescribed, but not used, the problems varied from improper regulation to insufficient instruction. In the 10% of cases in which hearing aids were prescribed and systematically used, a positive effect on the speech development was observed. Figures 3; references 9: 5 Russian, 4 Western.

6508/12955
CSO: 1840/126

DELAYED DEVELOPMENT AND PRODUCTION OF INFANT FORMULAS

Alma-Ata NARODNOYE KHOZYAYSTVO KAZAKHSTANA in Russian No 9, Sep 86, pp 26-30

[Article by E. Pashina: "Why Can't 'Health' Be Bought?"]

[Abstract] Excellent products for feeding of non-nursing children have been developed in Kazakhstan, and one of these is "Baldyrgan," a formula containing protein, fats, carbohydrates, vitamins, iron, copper, zinc, calcium, magnesium, phosphorus and potassium, as well as 18 different amino acids. Although facilities in Alma-Ata prepare 22,000 portions of this marvelous substance, this is only 1/6th of the demand for children under 1 year of age. The problem can be solved radically only by industrial production of the substance. Although "Baldyrgan" was invented 12 years ago, it is still not in mass production. This and other substances including one called "Zdorovye," the Russian word for "health," are greatly delayed in being brought to production. Problems include the difficulty of manufacturing the substances, the fact that they spoil quickly, and the fact that they require high quality, pure ingredients. Another major retarding factor is the "departmental psychology" of the various administrative departments which must work together in order to produce a new substance. Defending narrow departmental interests, bureaucrats effectively are preventing introduction and production of valuable new health products.

6508/12955

CSO: 1840/107

CREATION OF REGIONAL HEALTH CENTERS

Moscow SOVETSKAYA ROSSIYA in Russian 15 Oct 86 p 4

[Article by Aleksandr Nemov]

[Abstract] It is noted that there is a clear deficit of highly qualified medical services, medications and, most importantly, a shortage of attention of physicians to their patients today. This article presents a discussion with A. I. Potapov, Head of the RSFSR Ministry of Health, on restructuring of Public Health Services. Potapov complains that patients are frequently treated as numbers in the medical system, and suggests a change in the current standards. Increasing numbers of letters of complaint are reported from Krasnodar, many concerning the cardiologic service, since there is no modern cardiologic dispensary in the Kray, or even sufficient numbers of cardiologic beds in hospitals. Citizens in Moscow Oblast lack sufficient specialized ophthalmologic services. The solution is said to be the development of the local network of public health services, particularly the creation of large, well-equipped inter-Oblast and inter-Rayon preventive, diagnostic and treatment centers.

6508/12955

CSO: 1840/110

NUTRITIONAL FACTORS AND GALL BLADDER DISEASE IN RURAL POPULATION OF LATVIAN SSR

Moscow VOPROSY PITANIYA in Russian No 4, Jul-Aug 86
(manuscript received 4 Jun 85) pp 26-31

[Article by L. Yu. Zhikhar and N. A. Skuya, Latvian Scientific Research Institute of Experimental and Clinical Medicine; Riga Medical Institute]

[Abstract] A study was conducted on the relationship between nutrition and gall bladder disease (right subcostal syndrome) in rural Latvia, encompassing a total of 6657 individuals ranging in age from 20 to 60 years. Data provided by questionnaires demonstrated that the diet of the rural population in Latvia consists largely of animal products, and is deficient in polyunsaturated fatty acids, fiber, and ascorbic acid. In general, the energy value of the food intake of obese individuals was some 14% higher than of individuals with normal weight. Individuals with gall bladder disorders ate less eggs, vegetables and fruits to a statistically significant degree than disease-free subjects. There were no telling dietary differences between individuals with gall bladder disease and individuals lacking this form of pathology in the normal body weight category. Similarly, no dietary differences were detectable between diseased and disease-free obese subjects. However, obese individuals afflicted with the disease tended to have irregular eating habits and ate rapidly. On an overall basis, 3.54% of the men were afflicted with gall bladder disease and 9.6% of the women. References 22: 13 Russian, 9 Western.

12172/12955
CSO: 1840/084

UDC 615.12 + 614.27

ADMINISTRATION OF DRUG SUPPLY BASED ON ORGANIZATION OF ASSOCIATIONS

Moscow FARMATSIYA in Russian No 3, May-Jun 85
(manuscript received 12 Jun 84) pp 5-8

[Article by D. S. Volokh, Main Pharmaceutical Administration, UkSSR Ministry of Health, Kiev]

[Abstract] One of the more important aspects of improving administration of drug supply is application of modern computer and communication technology. Several studies indicated that organization of associations was the most effective approach to this problem and specifically two types of such organizations were recommended: one at the republican level and one the level of oblast. A committee was organized for the overall coordination of all activities, its membership including directors of member institutes, leading scientists and experts. During January 1984, the republican production-

scientific Association "Farmatsiya" was organized consisting of the following components: Main Pharmaceutical Administration (CPPA) of the UkSSR Ministry of Health; Laboratory NOT [Scientific Organization of Labor?] and administration of CPPA, UkSSR Ministry of Health; Pharmacy Department of Kiev Scientific Research Institute of Pharmacology and Toxicology, Kharkov Pharmaceutical Institute and Pharmaceutical Departments of Zaporozhe and Lvov Medical Institutes as well as Kiev Institute for Advanced Training of Physicians. Preliminary estimates indicated that such an organization should save the republic about 250,000 rubles per year. It mobilized creative activity of pharmaceutical workers, accelerated dissemination of technological innovations and improved drug supply to the population at large. References 9: 8 Russian, 1 Western.

7813/12955
CSO: 1840/090

UDC 615.12+614.27]:65.012.2

DEVELOPMENT OF COMPLEX PLANNING AND FINANCIAL TASKS OF AUTOMATED "CENTRAL PHARMACY-PATENT ADMINISTRATION SUBSYSTEM"

Moscow FARMATSIYA in Russian No 3, May-Jun 85
(manuscript received 28 Apr 84) pp 8-12

[Article by L. V. Borisenko, V. F. Martynenko and Ye. Yu. Boyko, All-Union Scientific Research Institute of Pharmacy; All-Union Scientific Research Institute of Social Hygiene and Organization of Public Health imeni N. A. Semashko, Moscow]

[Abstract] In the early 70's a transition was made to computerization of the more labor intensive functions of planning and financial activities of the main Pharmaceutical Administration of the USSR Ministry of Health. Quality of work improved without personnel increase. This work depends on statistical input from subordinate units. Management of such data is a laborious and costly process, therefore it was the first activity to be computerized, using a third generation "Minsk-32" computer system. Further developments included transition from the processing of statistical data only, to introduction of prognostic indices for development of pharmacies system. This is a novel approach applicable at all levels of the government down to the oblast. References 4 (Russian).

7813/12955
CSO: 1840/090

ORGANIZATIONAL IMPROVEMENT OF MOTHER AND CHILD DRUG SERVICE

Moscow FARMATSIYA in Russian No 3, May-Jun 85
(manuscript received 23 Jan 85) pp 62-64

[Article by V. M. Tolochko and A. G. Omelchenko, Kharkov Pharmaceutical Institute, Kharkov Oblispolkom Pharmacy Administration]

[Abstract] The status of medical service for mothers and children was evaluated on the basis of the Kharkov Oblispolkom Pharmaceutical Administration where considerable experience existed in organizing specialized medical service. There are 171 specialized pharmacies in this system (15 of them pediatric and 2 for mothers and children). An important condition for proper medical assistance is rational distribution of the Pharmaceutical Institutes network. Analysis of various requirements showed that the ratio of pediatric to general pharmacies varied from 1:5 to 1:12. A single pediatric pharmacy can support 1 to 2 pediatric ambulatory polyclinic Institutes. In administrative regions with less than 100,000 population it is not justifiable to set up specialized pediatric pharmacies. A case was made for hybrid mother-child oriented pharmacies since the health of children is closely related to that of their mothers, especially during the breast-feeding period. References 4 (Russian).

7813/12955
CSO: 1840/090

UDC 371.716+613.053.5](477-21)

ACTUAL NUTRITION AND SOME HEALTH STATUS INDICES AMONG URBAN SCHOOL CHILDREN IN SEVERAL REGIONS OF UKRAINE

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 86
(manuscript received 16 Oct 84) pp 33-38

[Article by L. A. Mostovaya, L. D. Kamysheva, L. S. Yakovleva, I. A. Slivinskaya, S. P. Petrash, Ye. V. Malyuk, P. M. Karpovets, V. P. Kulchitskaya, Ye. V. Goncharuk and N. I. Turta, Laboratory of Pediatric Nutrition (Director: Professor L. A. Mostovaya), Kiev Scientific Research Institute of Nutrition Hygiene, UkSSR Ministry of Health]

[Abstract] Real nutrition of urban school children in several oblasts of Ukraine was studied during autumn and spring along with selected indices of their health status. In all, 2334 children were given questionnaires. Health status was evaluated by their physical development, frequency of chronic ailments and blood analysis. The study covered Voroshilovgrad, Kherson, Zakarpatska Oblast and Kiev, concentrating on three age groups: 7-8, 11-12 and 14-15 years old students. The girls' diet in all age groups and that of the boys in age group 7-8 corresponded to recommended standards;

diet of the older boys was below standard. The number of obese children was on the increase, resulting in a low percent (66.6%) of properly developed children. Recommendations were made concerning proper nourishment and balanced menus to be used by catering organizations working with the school program in the Ukrainian SSR. References 14: 13 Russian, 1 Western.

7813/12955
CSO: 1840/083

UDC 371.716(57-17)

HYGIENIC APPROACHES TO RATIONAL NUTRITION OF STUDENTS IN SOVIET NORTH

Moscow VOPROSY PITANIYA in Russian No 1, Jan-Feb 86
(manuscript received 21 May 85) pp 38-42

[Article by V. M. Krasnopevtsev, Moscow Scientific Research Institute imeni F. F. Erisman]

[Abstract] An attempt was made to develop scientific basis for hygienic approaches to rational nutrition of northern territory students. Actual nutrition, energy losses, their health status and some metabolic indices were studied on subjects attending Norilsk school [internat] #2, selecting Russian nationals born there or residing for at least 5 years. It was shown that energy consumption was 5-18% higher than normal level for moderate climate zone. The following standard was proposed: a minimum of 125 g protein, 130 g fat and 980 g carbohydrates during theoretical studies. At least 60% of total protein and 85% of fat should be of animal origin; this was adequate for energy consumption of about 3600-3800 Kcal. During practical exercise, daily caloric intake should be 4000-4200 Kcal, corresponding to 140 g protein, 145 g fat and 520 g carbohydrates. These rations should be supplemented with 100 mg vitamin C and 1 mg vitamin B₁. References 12: 11 Russian, 1 Western.

7813/12955
CSO: 1840/083

CONFERENCES

UDC 615.2/.3.012:061.3(47+57)"1984"

ALL-UNION SCIENTIFIC-PRACTICAL SEMINAR 'STATE OF INDUSTRIAL PRODUCTION OF MICROFILTRATION MEMBRANES AND THEIR USE IN VARIOUS BRANCHES OF NATIONAL ECONOMY'

Moscow FARMATSIYA in Russian No 3, May-Jun 85
(manuscript received 31 Aug 84) pp 90-91

[Article by I. V. Besedina and A. V. Griboyedova, Moscow]

[Abstract] The title seminar was held 13-15 June 1984 in Kazan with participation of representatives from many industries: food, milk, wine, medical, pharmaceutical and epidemiological service. A. A. Moiseyenko and S. P. Zhukovskoy discussed principal aspects of sterilization filtration of injectables and antibiotics using "Vladipor" membranes. Experience with cellulose acetate membranes was reported by N. V. Burenko. Membrane micro-filters are used in blood substitutes industry in production of influenza vaccines for concentration of viruses and lipid-protein complexes (as reported by Ye. S. Kosolapova and Z. I. Zolinova). Some of the difficulties experienced in the field included nonavailability of pre-filters and proper equipment in general. Interesting application of "Vladipor" membranes was found in analysis of the quality of drinking water, the method being rapid, simple and inexpensive. Seminar participants had the opportunity to site visit production facilities of the microfiltration membranes at the Kazan plant "Tasma". The Fourth All-Union Conference on membrane separation of mixtures will be held in 1986.

7813/12955
CSO: 1840/090

SECOND ALL-UNION CONFERENCE ON NEUROSCIENCES

Kiev NEYROFIZIOLOGIYA in Russian Vol 17, No 6, Nov-Dec 85, pp 843-845

[Article by L. L. Voronin]

[Abstract] The title conference was organized by Tbilisi University and the Georgian Physiological Society and held 4-8 March 1985 in Bakuriana. The program encompassed a broad range of problems concerning studies of the nervous system at various levels using various methods. Reports of particular interest included "modelling of structures responsible for the transmission of the nerve pulse," presenting data on construction of artificially-excited membranes, showing that by using toxins influencing the operation of potential-sensitive channels, it is possible to identify proteins in non-cellular systems which form ion channels; a report on increasing vestibular excitability under reduced gravitational loading in humans and apes, manifested as a change in a number of visual setting parameters, revealing two paths of concentration for disruptions resulting from changes in the vestibular flow. One path is called "behavioral," by reducing head movements, while the other is called "central," by blocking vestibular afferentation in motor control systems; and two reports on the nature and purpose of sleep involving animal and human experiments. The animal experiments described a complex of changes occurring after deprivation of paradoxical sleep, explaining the complex by the inadequacy of the method of deprivation, causing stress.

6508/12955

CSO: 1840/071

MISCELLANEOUS

UDC 007:539.3:612.816:612.833

MODULATION OF MECHANICAL CHARACTERISTICS OF NATURAL AND SYNTHETIC COMPOSITES

Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 6, Jun 86
(manuscript received 24 Dec 85) pp 75-83

[Article by A. A. Krauklis and A. P. Dreymanis, Latvian Institute of Clinical and Experimental Medicine, Latvian SSR Ministry of Health]

[Abstract] The general mechanical and viscoelastic characteristics of muscle fibers are reviewed as a potential model for synthetic composites which could be subjected to modulation by external fields (mechanical, electromagnetic, temperature). However, the situation in muscles is complicated by transformation of chemical energy into mechanical within the fibril itself, and control of mechanical processes in the muscle tissue by the nervous system. The muscle system, considered as a biocomposite, is analyzed at 5 levels of structure (filamental, sarcomeric, molecular, myofibrillar, and fibrillar) to arrive at a structural-molecular approach to viscoelastic transitions in the muscle fiber. Theoretical foundations are then laid for the application of such reasoning to such composites as polyvinylidene fluoride to achieve external modulation of mechanical properties. Figures 3; references 29: 16 Russian, 13 Western.

12172/12955
CSO: 1840/059

UDC 59.087:591.5:621.398

USE OF TRACKING RADIOTRANSMITTERS IN STUDIES OF ANIMAL ACTIVITY

Moscow ZOOLOGICHESKIY ZHURNAL in Russian Vol 65, No 4, Apr 86
(manuscript received 21 Mar 85) pp 607-611

[Article by V. Ye. Sokolov and V. P. Sukhov, Biology Faculty, Moscow State University]

[Abstract] Radiotracking provides accurate information on location, mobility and even type of activity of animals studied using changes in signal

amplification. A signal with stable amplitude indicates animals at rest; an animal on the move shows changing amplitude due to changing orientation of the antenna and when an animal enters a cover, the amplitude drops significantly. Contact, temperature and capacity sensors assist in estimating activity of animals being tracked. An example of such record was reported for muskrat. Studies of amphibious mammals require a more complex setup to allow contact with the animal under water: normally, registration of signal amplitude is coupled with pulsed frequency. Thus, it was shown that simple methods requiring no special alterations in the electric systems of the tracking transmitters enlarge their data collecting power. Figure 1; references 29: 6 Russian, 23 Western.

7813/12955
CSO: 1840/074

UDC 591.619+598.128

EXPERIENCE IN BREEDING CAUCASIAN VIPER (VIPERA KAZNAKOWI) IN CAPTIVITY .

Kiev VESTNIK ZOOLOGII in Russian No 3, May-Jun 86
(manuscript received 23 May 84) pp 78-81

[Article by A. T. Bozhanskiy and S. V. Kudryavtsev, All-Union Scientific Research Institute of Nature Protection and Preservation, USSR Ministry of Agriculture; Moscow Zoological Gardens]

[Abstract] Several attempts were made at breeding, in captivity, captured Caucasian vipers (*Vipera kaznakowi*), including pregnant females shortly before term. On the basis of successes and failures, a basic approach was delineated for the preservation and breeding of this species in captivity. The principles may be encompassed in four stages, simplified to the following essentials: stage I -- capture of primary breeders, selection of parental pairs in nature, or capture of pregnant females in the earliest stage of pregnancy; stage II -- raising the young with development of appropriate nutrition and UV-irradiation regimens; stage III -- maintenance of adults with development of appropriate technology for optimal health; and stage IV -- preparation of adult for breeding with the use of an artificial wintering season, UV-irradiation, and "hyper-vitaminization". Figure 1; references 2 (Russian).

12172/12955
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